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THE PENETRATION OF YÜN-NAN.

ARTHUR PURDY STOUT, F.R.G.S.

The story of exploration in Yün-nan, the southwest corner of the Chinese Empire, by foreigners has in almost every instance, been inspired by the desire of the English and French to draw the trade of western China on the one hand towards the Indian Ocean and on the other towards the Gulf of Tonkin and the China Sea.

Among the English ambitions was (and is) the hope of linking China with India by a great trans-continental railway line. Up to the present time the victor's palm belongs to the French, for in January, 1910, they completed a railway from Haiphong on the gulf of Tonkin to Yün-nan fu, the capital and chief city of the province. The English have not yet connected even the borders of China with their Burmese possessions. The reason for this lies not in any lack of initiative on the part of the English nor in racial superiority of the French but it is due, as we shall presently see, to the physical arrangement of the mountains and rivers in that region.

Therefore the history of exploration in Yün-nan is so intimately bound up with the endeavor to penetrate the country for commercial reasons, that in telling the story of the latter one cannot avoid including the former. The story, I believe, is worth the telling if only as a striking example of the tremendous efforts and sacrifices which individuals and nations are willing to make for the advancement of their trade interests. We, in America, are not vitally interested in Yün-nan at the present time. Indeed to the vast majority of us, the name is not even known. Some day, however, the Euphrates Valley or some similar railway through Persia will connect India with Europe—and the line across the continent will be completed from India to China; which means that the road has got to enter China through Yün-nan—whether directly through Burma or indirectly from Burma, across Siam to the French line. In any case Yün-nan is the key to the situation.

The subject has been very thoroughly and charmingly treated by Mr. Hugh Clifford, in his book "Further India."¹ But that work is

¹ Clifford, H., "Further India," London, 1904.

now seven years old, it is out of print, and it deals with the affair from a purely geographical point of view. For these reasons I trust that the present paper will not be wholly superfluous. In any case, to anyone who feels interested and who wishes to read a delightfully written book, I heartily recommend the above mentioned work.

A word as to bibliography. Cordier in his "*Bibliotheca Sinica*"² gives most of the references used in the preparation of this paper, but it is a somewhat tedious job digging them out of the four great indigestible volumes. I therefore give at the bottom of each page the most important references, and a list at the end, of works which I have not used in compilation but which are sufficiently important and interesting to be worth recording. I have not attempted to deal with the history, ethnography or anthropology of the inhabitants of the country. Indeed the heterogeneous tribes of Yün-nan present such a knotty problem that not even the greatest authorities have yet succeeded in unravelling it.

In order that we may have a clear idea of the lay of the land I shall quote *in toto* the short chapter on the physical description of Yün-nan in Major H. R. Davies' recent work.³

"The main characteristic of the Province of Yün-nan is that it is an extremely mountainous country. So small indeed are the areas of flat ground, that on a small scale map they are almost lost in the masses of hills.

"Although the whole province is mountainous, different parts of it differ somewhat in the direction of the main ranges and in the general character of the country.

"The western part of Yün-nan is furrowed by rivers whose general course is from north to south. Taking them in order from the west, these are the Taping, the Shweli, the Salween, the Mekong, the Black River, and the Red River. Of these the first two and the last two have their sources in the province; but the Salween and the Mekong are rivers of great length, which run down from far in the interior of Tibet, and do not reach the sea until they have passed many hundreds of miles beyond the southern frontier of Yün-nan.

"The basins of these six rivers with their numerous tributaries.

² Cordier, H., "*Bibliotheca Sinica*—Dictionnaire Bibliographique des ouvrages relatifs à l'Empire Chinois," 4 vols., Paris, 1904-1908.

³ Davies, H. R., "*Yün-nan, the Link between India and the Yangtze*." Cambridge, 1909, pp. 303-305.



FIG. 1. BRIDGE OVER THE SALWEEN "WHERE IT CROSSES THE MAIN ROAD FROM BURMA TO YÜN-NAN FU." Looking east.



FIG. 2. THE SAME LOOKING WEST TOWARDS BURMA.

form a country of deep, narrow valleys and high mountain ranges running parallel to each other in a general north and south direction. As the rivers and the principal affluents flow from north to south, it follows naturally that the heights of the mountains should diminish as they run southward. In the extreme northwest corner of Yün-nan the country is thoroughly Tibetan: the tops of the ranges rise here to 15,000 or 20,000 feet, and the lowest river valleys are 7,000 feet. From here heights decrease fairly regularly till the hill tops run down to as low as 5,000 feet in the south of the province.

"Of the rivers which water this country some have cut much more deeply than others into the original plateau formation. The Salween, for instance, where it crosses the main road from Burma to Yün-nan fu, at about the 25th line of latitude, runs at an elevation 2,000 feet lower than the Shweli and the Mekong, which flow parallel to it at only a short distance.

"This makes it difficult to speak generally of the relative heights of the mountain ranges above the valleys. Speaking very roughly, and including the large tributaries as well as the main rivers, it may be taken on an average that the valleys run at an elevation some 3,000 or 4,000 feet below the tops of the mountain chains which bound them.

"This then is the general character of the western and southern parts of Yün-nan, but the eastern half of the province is of a somewhat different formation. The country is here more of the nature of a plateau, plains are more numerous, and many of them contain lakes of considerable extent. It would be a mistake to suppose that this part of the province is not mountainous, but it is on the whole less so than western Yün-nan.

"Roughly speaking the western boundary of this plateau country may be taken as a line drawn from the Yangtze at Shih-ku (lat. $26^{\circ} 50'$, long. $99^{\circ} 55'$) southward to Ta-li Fu and thence southwest to Shih-ping Chow (lat. $23^{\circ} 40'$, long. $102^{\circ} 35'$). To the east the plateau character of the country is maintained up to the border of the province, and in the extreme southwest corner the country is in many parts broken up into numerous small basins from which the water has no outlet. To the north and northeast the plateau continues until it nears the Yangtze, when it breaks up into deep valleys which, bounded by almost precipitous mountains, run down into the great river. The streams on the extreme western fringe of

this plateau drain into the Mekong and the Red River. But the main part of the water of eastern Yün-nan flows into the Yangtze and into the waters of the West River of Canton.

"The general direction of both of these rivers is from west to east, but unlike western Yün-nan, where the tributaries follow the direction of the main streams, the affluents in eastern Yün-nan of these two big rivers join them more or less at right angles. Consequently, though the drainage of this part of the province eventually goes eastward, most of the lesser rivers and mountain ranges run north and south.

"The rivers both in western and eastern Yün-nan run for the greater part of their courses through steep mountains, which sometimes form nearly precipitous gorges, and sometimes slope more gently up. Occasionally a valley widens out to a breadth of a few miles and forms a cultivated and thickly populated plain."

Yün-nan is bounded on the north by a small corner of Tibet, the Yangtze river and beyond that the province of Ssü-ch'uan. On the east by the provinces of Kwei-chow and Kwang-si. To the south lie Ton-kin and Burma and to the west Burma and Tibet.

Towards the close of the thirteenth century, to be exact about 1272, the first white man of whom we have knowledge visited Yün-nan. This was that prince of travelers Ser Marco Polo, the Venetian. He entered the province from the north, travelling from Chen-tu, the capital of Ssü-ch'uan province probably by way of Ba-T'ang on the Tibetan borders, to Yün-nan fu, the capital, which he called Yachi.⁴ From here he turned westwards: "After leaving the city of Yachi of which I have been speaking, and travelling ten days towards the west, you come to another capital city which is still in the province of Carajan, and is itself called Carajan." This is the famous city of Ta-li fu of which we shall hear a great deal later on. The Venetian saw here "great serpents of such vast size as to strike fear into those that see them . . . some of them are ten paces long . . . and in bulk they are equal to a great cask." These according to Yule are alligators, although there are none at Ta-li today to my knowledge.

"When you have left Carajan, and have travelled five days westward, you find a province called Zardandan . . . the capital city is

⁴Yule, H., "The Book of Sir Marco Polo, the Venetian," 2 vols., 1871. Vol. II, p. 42 et seq. Also edition by Cordier, 1903.



FIG. 3. FORTS GUARDING THE WESTERN PASS INTO THE TA-LI FU PLAIN.



FIG. 4. BRIDGE OVER THE SHWELI—ON THE ROAD BETWEEN YÜN-NAN FU AND BHAMO.

called Vochan." This is the city of Yung-chang fu, the country of the "Gold-Teeth" and here a mighty battle was fought between the King of Mien (Burma) and the captain of the Tartar host, Nes-cradin.⁵ The King of Mien had two thousand elephants with war castles on their backs⁶ and these so frightened the horses of the Tartars that they refused to advance. But a well directed hail of arrows caused the elephants to flee in disorder, breaking the castles; "so off they sped with such a noise and uproar that you would have trowed the world was coming to an end!" After this the King's men could not stand against the seasoned warriors of the great Khan.⁷

This is as far as Polo got but he gives a description of the trade which took place between Burma and China and of the kingdom itself. Time serves but to brighten the luster about the name of the old Venetian traveller, who fared so far, saw so many surprising things and described them with such naïve freshness.

Marco Polo realized that a considerable trade had taken place between China and Burma for a long time before he wrote and we know that it was continued through the coming centuries, interrupted at times by war and reestablished by embassies between Ava and Peking.⁸ That Bhamo has long been the Burmese terminal we may be assured from finding on Fra Mauro's map in 1459 the rubric "Here goods are transferred from river to river to go to China," which Yule has identified with Bhamo.⁹

There is no other reference to the subject until we come to the middle of the seventeenth century, when there is evidence for believing that the English and Dutch had a factory on the Burmese

⁵ Sent out by Kublai Khan.

⁶ Anyone who has travelled the road between Têng-yue and Yung-chang will marvel at the feat of bringing 2,000 elephants over the mountain ridges and through the deep rivers that lie between.

⁷ Wars between Burma and China, described by Marco Polo, and by Burmese historians. Chinese Rep., Vol. IX, p. 134, 1840.

⁸ Burney, "Narrative of a Four Years War between Burma and China." Chinese Repository, Vol. IX, p. 469, 1840; Burney, "Embassies between Ava and Peking, *ibid.*, p. 437; Huber, E., "Une Ambassade chinoise en Birmanie en 1406." Paris, 1904.

⁹ Yule, H., "Trade Routes to Western China," *Geog. Magazine*, Vol. II, p. 97, 1875.

border of China which is supposed to have been situated at Bhamo.¹⁰ But it appears that they were driven out in 1658¹¹ and beyond the fact that such a factory did exist, they have left no records. Reports of the thriving trade between Burma and China reached the English at Fort St. George in 1680 and one Dod was sent to inquire into it but his mission was a failure.

During these years, the Jesuit missionaries on the Chinese side were not idle, and we have records of their surveys in western Yün-nan, which they performed at the instance of the Emperor of China. The Jesuit DuChatz, at the end of the seventeenth century, reached Bhamo from the Chinese side,¹² probably the first white man to do so; a feat which was not repeated until Sladen's mission returned from Teng-yüé in 1868. The first regular mission was established in 1702 and in that year Père LeBlanc entered the province and established himself in the capital. He was visited in 1706, by Le-Couteulx, who was on his way to Kwei-chou. The survey of the province was accomplished between the years 1714 and 1716 by fathers Bonjour Fridelli and J. B. Régis—father Bonjour dying "sur les frontières du Royaume d'Ava et de Pegou" in 1714. All these missionaries entered the province from the north, crossing the Yangtze from Ssü-ch'uan.¹³ The geographical information about Yün-nan which appeared in the works of DuHalde,¹⁴ D'Anville¹⁵ and other early historians and geographers was drawn entirely from these missionaries and from Chinese sources; needless to say it was extremely hazy as to detail.¹⁶

When we reach the beginning of the nineteenth century, upper

¹⁰ Yule, H., "Embassy to Ava," p. 215, 1858.

¹¹ Anderson, J., "Report on the Expedition to Western Yunan," p. 45, 1871.

¹² Anderson, *ibid.*, p. 46.

¹³ Pourias, "Huit ans au Yun-nan," p. 19; Launay, A., "Mission du Kouy-Tcheou," 3 vols., Soc. Miss. Ét., 1907, Vol. I, Chap. 2; Cordier, H., "Bibliotheca Sinica," Vol. I, 1904, cols. 185-186; DuHalde, J. B., "Description . . . de l'Empire de la Chine," 4 vols., 1736, Vol. I, preface, p. xlii.

¹⁴ DuHalde, J. B., "Description . . . de l'Empire de la Chine," 4 vols., La Haye, 1736, Vol. I, p. 247.

¹⁵ D'Anville, "Nouvel Atlas de la Chine, de la Tartarie et du Thibet," La Haye, 1737. This was first completed for Yün-nan in 1729.

¹⁶ Williams, S. W., "Topography of the Province of Yün-nan," Chinese Rep., XVIII, p. 588. Quoting from the "Nouvelles Lettres édifiantes des Missions de la Chine et des Indes Orientales," 8 vols., 1818-23, Vol. I, pp.



Photo. by H. B. Perrin.

FIG. 5. STREET SCENE IN SOUTHERN YÜN-NAN.



Photo. by H. B. Perrin.

FIG. 6. CHIEF GUEST ROOM IN A CHINESE INN.

Burma appears to have been as much of a blank page to the English in Rangoon as Western China—for we learn that the first detailed description of the Irrawaddy up to Mandalay was given by Lieutenant Woods and Dr. Buchanan, of Symes Embassy, in 1795.¹⁷ Crawford's 1826 Embassy augmented this with second-hand information of the Upper Irrawaddy.¹⁸ But by this time the English had a firm footing in Bengal; and the country between Bengal and China, namely Assam and upper Burma, was about to be the scene of some careful and extensive exploration. In 1826 Messrs. Wilcox and Boulton went from Sadiya on the Brahmaputra in Assam across country to Mantchi in the valley of the Nam Lang, a tributary of the Irrawaddy. Here they were within 20 miles of the survey of the Jesuit Missionaries of Yün-nan but could go no further.¹⁹ Pemberton travelled from Manipur to Ava overland, while Richardson reached Kendat in the Chindwin valley, where he joined Captain Grant, who had come over from Manipur.²⁰ Captain Hannay, in 1835,²¹ and Dr. Bayfield, in 1836-37,²² explored the country up to the borders of Assam, Captain Hannay being the first Englishman to reach Bhamo since the removal of the East India Company's factory. His researches practically proved that the Tsan-po river of Tibet and the Irrawaddy were distinct, although Mgr. de Mazure Vicaire Apostolique de Tibet believed that they were identical as late as 1861.²³ In the same year Dr. Griffith, also starting from Sadiya, crossed the Patkoi range to the Mogoung river, descended this to the Irrawaddy and so reached the sea at Rangoon.²⁴

305-317, he speaks of the visit of M. Gleyo of the Ssü-chuan mission to the country of the Lolos which he places in the southern part of the province.

¹⁷ Symes, M., "An account of an Embassy to the Kingdom of Ava . . . in 1795," London, 1800.

¹⁸ Crawford, J., "Journal of an Embassy . . . to the Court of Ava," 2d ed., 2 vols., London, 1834.

¹⁹ "Papers on the Hill Tracts between Assam and Burmah," *Bengal Secretariat Press*, 1873, p. 1.

²⁰ Pemberton, R., "Report on the Eastern Frontier of British India," 1835.

²¹ "Papers on the Hill Tracts," p. 83.

²² *Ibid.*, p. 134.

²³ D'Mazure, Thomine, "Memorandum of the Countries between Thibet, Yunan and Burmah." Notes by Col. H. Yule. *Jour'l As. Soc. Bengal*, Vol. XXX, 1862, p. 367.

²⁴ Griffith, "Papers on the Hill Tracts," p. 125; see also, Davis, Sir J. F., *Trans. Roy. As. Soc.*, Vol. II, p. 90, 1827.

idle. In 1829 Richardson attempted to reach Zimmé (Kèng Mai) from Moulmein but only got as far as Labong. He was successful in 1834 however.²⁵ His instructions were "to remove the obstacles which appear still to exist to the free passage of the Chinese overland caravans to Moulmein."²⁶ He repeated the performance in 1835 and this led directly to Captain McLeod's famous trip from Moulmein to the very borders of China, at Kèng Hung and Kèng Tung on the Mekong in the Chinese Shan states in 1836. He could get no further, for the Chinese turned him back, but he brought back much valuable information, which was buried in government reports, as usual.²⁷ In 1831 Captain Sprye proposed to open a trade route from Rangoon to Esmok (Ssümao), which he later developed into a railway line, leading through Siam and thence northwards through Kèng Tung and Kèng Hung to Ssümao. This proposition, although favored by many higher officials in British Burma, was not approved by the Government of India and nothing came of it except to survey the route from Rangoon northwards to Toungoo.²⁸ Major Davies²⁹ gives Captain Sprye the credit for the first proposition for drawing the trade of western China out to British ports on the Indian Ocean; but it is clear Englishmen in Burma and India had been thinking over the possibilities for at least forty years before this.

Activity in the field was almost dormant³⁰ through the middle of the century, although the subject was not allowed to die out. Thus Rowlatt, following Wilcox's route from Sadiya, forced his way to Tupang in 1844 and eleven years later two missionaries, Krick and Mowey, were murdered by the Mishmis in an attempt to cross their

²⁵ The trader Samuel was probably the first white man to see the town in 1618. See Clifford, "Further India," p. 268.

²⁶ Coryton, J., "Trade Routes between British Burmah and Western China," *R. G. S. Journal*, 1875, p. 229.

²⁷ "Papers relating to the Route of Capt. M'Leod . . . and Dr. Richardson," 1866.

²⁸ Sprye, "Communications with Southwest Provinces of China," *R. G. S. Proc.*, Vol. V, p. 45, 1860. For the rest of the vast literature on the subject see Cordier, "Bibliotheca Sinica," Vol. I, 1904, cols. 322-327.

²⁹ Davies, "Yün-nan," p. 4.

³⁰ The trips of Jenkins, Veitch, Brodie and Peal in the Burmese-Assam country add nothing new, so I have omitted them. "Papers on the Hill Tracts," pp. 245-333.

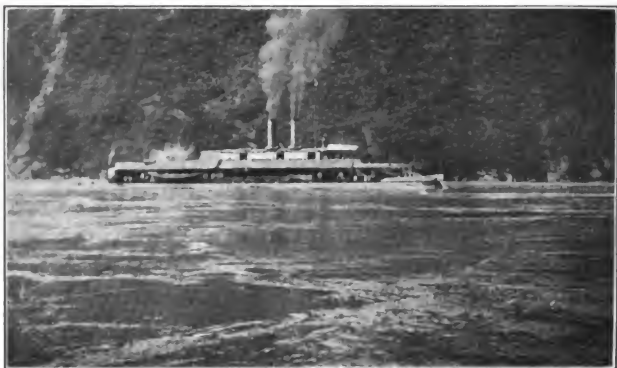


FIG. 7. H. M. S. *Widgeon* GOING FULL STEAM UP THE YANGTZE GORGES ABOUT 1,200 MILES FROM THE MOUTH OF THE RIVER.



FIG. 8. HOUSE-BOATS IN THE YANGTZE GORGES.

country towards China.³¹ Baron Otto des Granges in 1848 published "a short survey of the countries between Bengal and China, showing the great commercial and political importance of Bharno and the practicability of a direct trade overland between Calcutta and China."³² Dr. M'Cosh in 1861 advocated a route from Calcutta via Dacca, Sylhet, Manipur and Bharno to Western China.³³ Again in 1863 Dr. Clement Williams, formerly resident at the court of Mandalay, attempted to proceed up the Irrawaddy and cross over into China. He reached Bharno, but through the hostility of the local authorities was not allowed to get any further.³⁴ Finally in 1867 General Cotton strongly urged the advantages of a railway from Sadiya straight across the intervening portions of Tibet and Yün-nan to the upper reaches of the Yangtze, a distance of somewhat over 200 miles. This idea is attractive but its utter impossibility was clearly realized in the spirited discussion which followed its reading before the Royal Geographical Society.³⁵

We have now briefly reviewed the early attempts to penetrate China from Independent and British Burma and Assam up to the year 1868 (no attempts were made from the French territories or Siam until 1860 except by missionaries), all of which except McLeod's were uniformly signal failures from the point of view of their real motives, although incidentally much knowledge was acquired concerning the geography of Burma, the Brahmaputra and Irrawaddy and the various Shan States. The most notable result being the explosion of the myth concerning the continuity of the Tsan-po of Tibet with the Irrawaddy as shown upon the maps of D'Anville and Klaproth.³⁶ From this point forward we come to a

³¹ M'Cosh, "On the Various Lines of Overland Communication between India and China," *Proc. R. G. S.*, Vol. V, p. 47, 1860-61.

³² Anderson, J., Report, p. 55; Otto des Granges, "Short Survey of the Countries between Bengal and China," *J. As. Soc. Bengal*, Vol. XVII, 1848, pp. 132-137.

³³ M'Cosh, *ibid.*, p. 47.

³⁴ Williams, C., "Through Burmah to Western China," London, 1868.

³⁵ Cotton, "On a Communication between India and China by the Line of the Burhampooter and Yang-tsze," *J'nal R. G. S.*, Vol. 37, p. 231, 1867; *Proc. R. G. S.*, 1866-67, p. 255.

³⁶ D'Anville, "Nouvel Atlas de la Chine, de la Tartarie et du Thibet." La Haye, 1737; Klaproth, J., "Atlas Historique de la Chine," 1821.

series of far more important, adventurous and interesting expeditions, which we shall have to consider in more detail.

Mr. T. T. Cooper²⁷ became interested in the subject through conversations with Dr. Williams and various residents of Shanghai, who proposed to him to undertake an entirely new route, starting up the Yangtze as did Blakiston in 1860²⁸ and passing from Likang in northern Yün-nan, through Tibet to Sadiya. Accordingly in November 1868, he started by steamer from Shanghai and proceeded from Hankow to Chung King in the familiar house boat. Here he found that the Mohammedan rebellion²⁹ then raging in Yün-nan would prevent a direct procedure to Likang, and was forced therefore to make a detour to Chen-tu, capital of Ssu-ch'uan province, whence he travelled via Ya-chow to Ta-chien lu on the eastern borders of Tibet. During his Chinese travels he wore "pigtail and petticoats" but he now discarded them in favor of European costume because of the dislike of the Tibetans for things Chinese. Mr. Cooper could not talk Chinese and was forced to depend upon the services of an interpreter; he received invaluable aid from the kindness of the Jesuit missionaries, in particular the venerable Mgr. Chauveau, the vicar apostolic of Tibet, who had been in the country for forty years.

Up to this point the journey had been moderately adventurous: in the gorge near Ta-chien lu one of his chair bearers fell and his full weight in the chair hung over a precipice before he could be pulled up again, and at Ya-chow his coolies got into a fight with some baggage coolies so that his chair was upset and he received considerable rough handling in the mêlée. Passing westwards from Ta-chien lu he crossed the Ya-lung river (a large Yangtze tributary) at Ho-kou ferry in a circular basket boat covered with green hides, went through Li-t'ang and finally reached Ba-t'ang near the Dre Chu (Yangtze river). The Tibetans refused to allow him to proceed towards Assam, so he turned south towards Yün-nan.

²⁷ Cooper, T. T., "Travels of a Pioneer of Commerce," London, 1871.

²⁸ Blakiston, T., "Five months on the Yang-Tsze," London, 1862.

²⁹ The Mohammedan rebellion in Yün-nan lasted from 1855 to 1873 and was responsible not only for frightful loss of life and property but also for preventing the entrance of many would-be travellers into the province, and was one of the chief causes for the delay in its exploration. See Rocher, E., "Province Chinoise du Yunnan," 2 vols., 1879; De Thiersant, Dabry de, "Le Mahométisme en Chine," 2 vols., Paris, 1878.

Troubles began to multiply: first he was married unawares to a Tibetan girl, with whose presence he was considerably embarrassed until an obliging uncle took her off his hands. Then he ran head foremost into the rebellion and was finally imprisoned at Wei-hsi on the Mekong. This ended his forward progress and after much difficulty, including an attempt to escape in which he was recaptured, he was sent, in spite of his protests, all the way back over his former route and down the Yangtze, reaching Shanghai after almost a year's absence.

Undaunted by this check, he set out again almost at once for India, in order to reach Ba-t'ang from Sadiya. This journey,⁴⁰ made in 1870, succeeded in reaching a point on the Brahmaputra a short distance from the borders of Tibet, but into their country the lamas refused to let him go. So, filled with disappointment and sickness, for he was prostrated with fever, he returned to Calcutta.⁴¹ These expeditions effectually demonstrated the extreme difficulty of connecting India with the Yangtze by a direct trade route. The combination of hostile natives and tremendous natural obstacles was too much even for the enterprising Englishmen.

The other attempt in 1868 was a much more pretentious affair, for it was sent out by the Government of India to "attempt the passage of the Bhamô route,"⁴² and to reach Ta-li fu if possible. It was fully equipped and included in its personnel an engineer, naturalist and commercial representatives and was placed under the command of Major Sladen.⁴³ After endless bickerings with the local chiefs at Bhamô, which they had reached from Mandalay for the first time in a steamer, the party set out along the Taping river. If their difficulties had been great in Bhamô they were as nothing to what they had now to encounter. The Kachin⁴⁴ tribesmen en-

⁴⁰ Cooper, T. T., "The Mishmee Hills," 1873.

⁴¹ Mr. Cooper was murdered near Bhamô a few years after this.

⁴² Anderson, Report, p. 58.

⁴³ Sladen, Major, "Exploration to Southwestern China," *Proc. R. G. S.*, Vol. XV, p. 343, 1870-71; Anderson, J., "Report of the Expedition to Yunnan," Calcutta, 1871; Anderson, J., "Mandalay to Momein," London, 1876.

⁴⁴ Kachin (Chingpaw or Singpho) inhabit the country to the north, northeast and northwest of upper Burma. They are a wild and predatory folk who levy blackmail upon the more peaceful Shans in their neighborhood and were accustomed to exact heavy tribute from all travellers through their country. Since the English occupied upper Burma in 1885 they have been

deavored in every possible way to entrap and plunder them; their mules were spirited away, their men remained in a constant state of inebriety and they had the greatest difficulty in obtaining food.⁴⁵ After passing the border into China they came into the country of the Chinese Shans⁴⁶ and into the sphere of influence of the Moham-medan rebels of Yün-nan who were masters of the western half of the province at this time. Unfortunately matters were complicated by a Chinese robber chief who blocked their further advance and later attacked them but was repulsed. Finally they reached Teng-yué (Momein) after three months travel, although it requires but eight easy days to make the trip from Bhamó at the present time. The expedition got no further and so the country between the Teng-yué and Ta-li fu remained unexplored although as we shall see directly, the latter city was reached about this time by Garnier.

Some very interesting information regarding the northern part of Yün-nan reached the Indian Government in 1866 from the French missionaries there, by way of dispatches sent from the Nepalese Ambassador to China to his master, Jung Bahadur, in Katmandhu and by him transmitted to the government of India. It was chiefly an appeal for relief from persecution, but it also contained a good many facts about the country.⁴⁷ Before leaving this part of the country it will not be out of place to mention two more papers on the Assam route which end the attempts to find a direct way from India to China. In 1867 Mr. Goodenough proposed a route from Assam via the Hukung valley, across the upper reaches of the more or less subdued. See "Gazetteer of Upper Burma and the Shan States," Rangoon, 1900-01, 5 vols., Vol. I, pp. 331-439.

"It is still very difficult to obtain food in the Kachin hills. When I passed through them in 1908 my Chinese coolies almost starved. See "Stark, G. L., *The Letters of*," Cambridge, 1908, pp. 422-423.

"Shans or Tai, a widely distributed race extending from Assam to Kwang-si and from Yün-nan all through Indo-China and Siam. They have to some extent assimilated the characteristics of the various peoples among whom they dwell, but at one time they were a large and independent race. For reference see "Gazetteer of Upper Burma and the Shan States," 1900, Vol. I, pp. 187-330; Colquhoun, A. R., "Among the Shans," London, 1885; Lacouperie, T. de, "The Languages of China before the Chinese," 1887; Milne, Mrs., "Shans at Home," London, 1910, etc.

"*"Western China," Edinburgh Quart. Rev., April, 1868, pp. 368-374. See also Desgodins, Abbé, "Le Thibet," 2d ed., Paris, 1885; Launay, A., "Histoire de la Mission du Tibet," 2 vols., Lille, n. d.*



FIG. 9. "HORNED" WIA MIOUTZE WOMAN AT CHAO TUNG IN
EASTERN YÜN-NAN.



FIG. 10. MINCHIA WOMEN RETURNING FROM MARKET IN THE VICINITY OF TA-LI FU.

Irrawaddy to the Yangtze.⁴⁸ And lastly in 1876 Henry Cottam tried to force his way from Sadiya through the Khamti and Singpho country and so into Yün-nan, but as usual was turned back.⁴⁹

We are now ready to begin the story of the French endeavors to open up the province from the south; attempts which, although begun much later than the English in the west, were carried out with no less courage and determination and were crowned with success largely as we have said before, because the mountains and rivers of Yün-nan happen to run north and south instead of east and west.

The French arrived upon the scene in Cochin-China in 1862 when the Emperor of Annam recognized the rights of France over the three provinces of Lower Cochin-China.⁵⁰ They settled themselves firmly in the country and extended their dominions by forced treaty and conquest. They, too, were animated by the ardent desire to divert the chief trade of China to their own sea-ports, and to open the road for French manufactures and goods to reach western China. They believed that the great Mekong river which flowed into the sea at Saigon would furnish the artery for commerce.

We have hardly space enough to do more than mention the European explorations in the Hinterland of Indo-China before de Lagrée and Garnier. The first traveller was the Dutch trader Gerard van Wusthof,⁵¹ who went up the Mekong as far as Vien-Chan in Annam. While there he met a Piedmontese Jesuit priest by the name of Leria, who was the only Christian priest to penetrate Laos until the latter half of the nineteenth century.⁵² The next attempt was not made until 1861 when Henri Mouhot,⁵³ starting on his last journey, went up the Menam river from Bangkok, struck across country to Mekong which he reached at Pak Lai and from whence he passed on up the river to Luang Prabang in the Laos States of Annam. Near this spot he died, the last pathetic words in his journal being:

⁴⁸ Goodenough, F. A., "Routes between Upper Assam and Western China," *Proc. R. G. S.*, Vol. XII, pp. 334-336, 1867-68.

⁴⁹ Cottam, H., "Overland Route to China," *Proc. R. G. S.*, Vol. XXI, 1876-77, p. 590.

⁵⁰ deCarné, L., "Travels in Indo-China," 1872.

⁵¹ Garnier in *Bul. Soc. de Géog.*, Paris, 1871, pp. 249-289.

⁵² Clifford, H., "Further India," p. 207.

⁵³ Mouhot, H., "Travels in the Central Parts of Indo-China," 2 vols., London, 1864.

"Octobre 29me,—Ayez pitié de moi, O mon Dieu!" Five years later a Dutchman by the name of Duyshart, a surveyor in the employ of the Siamese government, surveyed the Mekong between Kêng-Kong and Luang Prabang, a distance of 225 miles. He also visited Kêng Mai (Zimmé). The French expedition met him on his way down the river, and he thus preceded them to the Chinese border by a few weeks. McLeod must not be forgotten in connection with this region. Starting from lower Burma in 1836 he passed through Siamese territory to Kêng Mai, bent upon reaching Yün-nan, he traversed the country to Kêng Tung and Kêng Hung,⁵⁴ a point higher up on the Mekong than any one before him⁵⁵ and a few miles higher than the French expedition reached at any time. Kêng Hung is just over the border of Yün-nan.

It was Francis Garnier, a young French naval officer, who proposed to the Government an exploring expedition⁵⁶ up the Mekong into China with the view of bringing Chinese trade to French ports, but he was considered too young a man to be given command, which was entrusted to the brave but ill-starred Doudart de Lagrée, a post captain in the navy. The rest of the force was made up of M. Thorel as botanist, M. Delaporte as artist, M. Joubert as geologist and M. Louis de Carné. There were also two marines and two sailors. They started in 1866 up the Mekong in two gunboats, but had to abandon them after two days and transfer to native craft. Proceeding slowly and exploring the country on either side of the river, examining its tributaries and studying the people and architecture in detail, they reached Ubon on the Se-mun tributary January, 1867. From here Garnier was forced to make a flying trip back to Phnom

⁵⁴ McLeod, "Abstract Journal of an Expedition to Kiang Hung," etc., *Journal As. Soc. Bengal*, Vol. VI, 1837, p. 989.

⁵⁵ So says Clifford in his fascinating book "Further India," but he is probably in error, for Dr. Anderson tells us ("Report on the Exp. to Western Yun-nan," 1871, p. 45) that the Jesuit DuChatz succeeded in reaching Bhamo from the Chinese side at the end of the seventeenth century. To do this he would have had to cross the Mekong at some point north of Kêng Hung, in all probability where the main route between Ta-li fu and Bhamo crosses it. So the credit belongs to him.

⁵⁶ Garnier, F., "Voyage d'Exploration en Indo-Chine," 2 vols. and atlas, Paris, 1873; de Carné, L., "Travels in Indo-China," London, 1872; "Explorations et Missions de D. de Lagrée," Paris, 1883; Clifford, H., "Further India," 1904. Good resumé; see also Cordier, "Bib. Sinica," Vol. I, cols. 330-332.

Penh for the purpose of getting some missing mails without which they could not proceed. This delayed them two months but they busied themselves exploring all the country in the neighborhood while waiting. By this time even the enthusiastic Garnier had to admit that the Mekong was too full of rapids and falls ever to be useful as a highway of commerce.

Luang Prabang was reached in April. Beyond this point difficulties began to beset them; Garnier and Thorel were sick with fever, Delaporte had to be carried on account of badly infected feet, their funds grew perilously slender and only the most careful handling of the native "Kings" procured their grudging permission to proceed. In September Kêng Hung was reached, the highest point they ever got to on the Mekong.

From here onwards they began to cover virgin country, unknown to any white man before them. They visited Ssū-mao (Esmok) and the tea districts of Pu-ehr and reached Yün-nan fu in December, 1867, seeing on all sides the fearful devastation caused by the Mohammedan rebellion. Here their eyes were gladdened by the sight of fellow countrymen, Fathers Protteau and Fenouil. From the capital they struck north, having been refused permission to go west to Ta-li, from which place they had hoped to examine the Mekong in its upper reaches. At Tong-chuan, de Lagrée became too ill to move any further, so keeping Joubert, who was a doctor, with him, he ordered the rest under Garnier to try for Ta-li and the Mekong.

Accordingly they crossed the Yangtze by a ferry far above Blakiston's highest point at Ping-shan and travelling through the province of Ssū-ch'uan, they passed Hui-li, visited the point where the great Yalung empties into the Yangtze and crossed back into Yün-nan at Ma-chang. In the Ta-li fu valley they met Père Leguillier a brave missionary, who remained at his post in spite of daily danger from the rebels and who, although forced to flee with Garnier, returned to remain there afterwards until he died in 1907.⁸⁷ He accompanied them into the city, but they were warned to leave at once and so were forced to return without having seen the Mekong again. On their way back, the sad news of de Lagrée's death reached them, and bringing his body with them, they reached

⁸⁷ Bacot, J., "Dans les Marches Tibétaines," 1900, p. 4.

Shanghai in June, 1868, descending the Yangtze in boats. They had been absent just over two years.

The mission was a failure in the main object for which it was sent out, namely to demonstrate the practicability of the Mekong as a trade route and to explore its course in Yün-nan—but it was glorious failure which brought back stores of geographical and ethnographical information about an almost unknown country. The death of the leader and the subsequent early deaths of Garnier and de Carné serve to cast an added glamour of romance over the whole story.

Turning again to Burma, we find that shortly after 1870, Watson and Fedden explored a route to the South of Bhamo known as the Thein-ni route; they succeeded in reaching within 20 miles of the latter Chinese city.⁵⁸ Again, Baron von Richtofen sent some very interesting information about the province to the Shanghai Chamber of Commerce in 1872. He tried to penetrate from the north but the rebellion stood in his way.⁵⁹

The Mohammedan rebellion came to a bloody finish in 1874 with the fall of Ta-li fu, the rebels' great stronghold, and the slaughter of everyone in the city. This was considered a favorable moment by the British authorities to send another mission, this time to cross China from Bhamo to Shanghai, and in order to obviate difficulties, Mr. Augustus Raymond Margary, of the consular service, in China, was instructed to proceed overland to Bhamo, there to join the mission after having prepared the way for its advent. This long journey⁶⁰ of nearly 3,000 miles was begun in August, 1874. He reached Teng Yué from Ta-li fu,⁶¹ thus giving us the first description by a white visitor of the country between; and crossing the Mekong, Salween and Shweli rivers, reached Bhamo in January, 1875. He is said to be the first white man to have crossed China from Shanghai to Bhamo; as far as we know this is true, but it would be no cause for surprise if some day, there came to light

⁵⁸ Yule, H., "Trade Routes to Western China," *Geographical Magazine*, Vol. II, p. 97, 1875.

⁵⁹ Richtofen, "Letters," 1870-72.

⁶⁰ "Journey of Augustus Raymond Margary," edited by Sir Rutherford Alcock, London, 1876.

⁶¹ Pourias, "Huit ans au Yunnan," 2d ed., Lille, 1889, mentions his visit to the city and the warning which all the Jesuits gave him of the dangers of his route, but which he laughed to scorn (p. 149).





the account of a Jesuit missionary who had been before him.⁶² Let us not grudge him his laurels, however, because of the tragic fate which soon overtook him.

The British force under Colonel Browne, and with Dr. Anderson again as chronicler,⁶³ started in February. The same difficulties which beset the former expedition met this one as soon as it got into the Kachin hills. Margary offered to go ahead of the rest to Manwyne to clear up the difficulties. He did so and was murdered in cold blood, undoubtedly by the Chinese authorities. The expedition itself, pushing on to ascertain the true fate of Margary, which remained uncertain for a time, was attacked and barely succeeded in escaping to Bhamo without further loss. One result of this expedition was the exploration of the Shweli valley by Mr. Ney Elias up to the borders of Yün-nan.⁶⁴

This murder was the straw that broke the camel's back, for besides having far-reaching effects upon the relations between England and China, it led to several expeditions which thoroughly examined the Bhamo route and threw grave doubts upon the practicability of its ever being utilized as a railway route. Thus in November, 1875, a mission under the Hon. T. Grosvenor started from Hankow to examine into the circumstances of Margary's murder. It reached Teng Yué via Yün-nan fu and Ta-li in 1876 and a careful report was made by the most delightful and exact English writer to travel in these regions. Indeed Mr. E. Colborne Baber's account of this and subsequent trips⁶⁵ deserves to rank with that of Huc,⁶⁶ while having the great advantage of being *true*; a term which we cannot always apply to the statements of the more fanciful Abbé.

In August, 1877, Mr. McCarthy of the China Inland Mission

⁶² M. Adrien Launay promised a book on the Catholic missions of Yün-nan some years back but it has never been forthcoming. He is an authority of the first order on this subject.

⁶³ Anderson, J., "Mandalay to Momein," London, 1876.

⁶⁴ Elias, N., "A Visit to the Valley of the Shweli in Western Yün-nan." *Journal, R. G. S.*, XLVI, p. 198, 1876.

⁶⁵ Baber, E. C., "Travels and Researches in Western China," *R. G. S. Supp. Papers*, Vol. I, pp. 1-201, 1882.

⁶⁶ Huc, "L'Empire Chinois," 2 vols., Paris, 1854.

reached Bhamo by the same route,⁶⁷ followed the next year by Captain Gill, who, before he came out, made some important explorations in Western China.⁶⁸ Other travellers over the same route at this time were Mr. Cameron,⁶⁹ a missionary in 1877 and in 1880 Count Bela Széchenyi,⁷⁰ an Austrian, who had just been foiled in an attempt to penetrate Tibet. Dr. Henry Soltan with Mr. Stevenson, both of the C. I. M., were the first white people who succeeded in crossing China from west to east, starting from Bhamo in 1879.⁷¹

While this flood of information was being poured forth in English books and journals about the western half of the province, the French were not idle in the south. As early as 1868 Jean Dupuis succeeded in reaching Yün-nan fu from Han-Kow; he repeated this feat in 1870 but went further, reaching Manhao on the Red River and saw that there might be a possibility of navigating it up to this point. Backed by the French government he tried to force the Tonkin authorities to declare the Red River open to commerce, but getting impatient at the delay which inevitably followed all dealings with the native government, he ascended the river in a native boat, in spite of the "Black Flags" (pirates), past the Chinese border at Lao-Kai, to Manhao, whence he travelled overland to Yün-nan fu, back to Manhao again, where he took on a load of Yün-nan copper and sailed down the river.⁷² The troubles resulting from this hasty action caused the death of Francis Garnier while fighting in 1873. Then a new commercial policy arose after the war, which caused the abandonment of this and all other routes from the south by the French. In connection with Dupuis we must not forget to mention E. Rocher, who travelled so extensively in Yün-nan and has published such a splendid work upon his researches there.⁷³

The next attempt upon the province took place from a new

⁶⁷ McCarthy, J., "Across China from Chin Kiang to Bhamo," *Proc. R. G. S. (N. S.)*, Vol. I, p. 489, 1879.

⁶⁸ Gill, W., "The River of Golden Sand," London, 1883.

⁶⁹ Clifford, "Further India," p. 295.

⁷⁰ Széchenyi, "Die Wissenschaftlichen Ergebnisse der Reise des Grafen B. Széchenyi in Ostasien," 3 vols. and atlas, 1893-99.

⁷¹ Soltan, H., "Across China from Bhamo to Shanghai," *Scott. Geog. Mag.*, Vol. IV, 1888, pp. 83-98.

⁷² Dupuis, J., "Voyage au Yun-nan et Ouverture du Fleuve Rouge au Commerce," Lyon, 1878.

⁷³ Rocher, E., "La province Chinoise du Yün-nan," 2 vols., Paris, 1879.

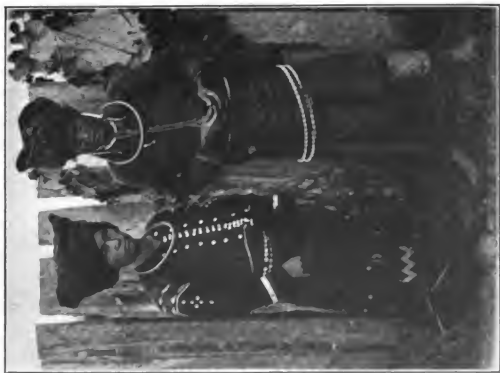


FIG. 12. KACHINS FROM THE KACHIN HILLS.



FIG. 13. CHINESE SHAN WOMAN FROM THE COUNTRY BETWEEN TENG-YUE AND THE BURMESE BORDER.

direction, namely the east. In 1882 A. R. Colquhoun accompanied by C. Wahab, ascended the West River of Canton to Pei-se on the border and travelled through southern Yün-nan, covering much new ground, to the frontier town of Ssü-mao, the terminus of the Burma-Chinese railway project so persistently exploited by the Spryes in the sixties. He wished to return to Burma through the country of the Shans but was prevented and had to go out over the now well-known Bhamo route. Mr. Wahab died a few weeks after they got to Burma, another victim to add to the long list of adventurous pioneers in this land.⁷⁴ As a result of this trip he advocated a railway line which started from Moulmein and passed through Raheng, Kêng-mai and Kêng-Hsen to Ssü-mao. This plan he defended warmly before many chambers of commerce and other commercial bodies in England. Several of these combined to send out Mr. Holt S. Hallett to survey this route and to examine the conditions of the country, which he successfully accomplished and reported upon.⁷⁵ Although vigorously exploited this route has also been abandoned.⁷⁶

The year of Hallett's journey, 1885, marked the seizure of Upper Burma by the English and the deposition of King Thibaw. This opened the country to the surveyor and explorer who covered it thoroughly, but with that we have nothing to do, for the country north of Bhamo had by this time been given up as a possible trade or railway route.

From now on French and English were busy in the interior of the province, gathering what information they could, traversing hitherto inaccessible parts and publishing the results. Thus Consul Hosie made three extensive journeys through southwest China in 1882, 1883 and 1884.⁷⁷ Consul Bourne reported on his researches in Yün-nan in 1885-86.⁷⁸ Mr. Clark, a missionary, published in 1885

⁷⁴ Colquhoun, A. R., "Across Chrysê," 2 vols., 1882; "Exploration through the South-China Borderland," *Proc. R. G. S.*, IV, p. 713, 1882; "Explorations in Southern and Southwestern China," *R. G. S. Supp. Papers*, Vol. II, p. 3, 1887.

⁷⁵ Hallett, H. S., "A Thousand Miles on an Elephant," 1890; "Exploration Survey for a Railway Connection between India, Siam and China," *R. G. S. Proc.*, Vol. VIII (N. S.), p. i, 1886.

⁷⁶ Colquhoun, A. R., "Dan to Beersheba," London, 1908, p. 164.

⁷⁷ Hosie, A., "Three Years in Western China," London, 1890.

⁷⁸ Bourne, F. S. A., "Report of a Journey in South-western China," China, No. I (1888).

a small book on the province containing information which he had collected during the course of his labors there.⁷⁹ In 1889-90 M. G. Bonvalot, accompanied by Prince Henri d'Orléans, made a long journey from Kuldja across Tibet and through Yün-nan to Tonkin, covering some new ground between Hui-li Chow and Yün-nan fu.⁸⁰ The following year Dr. Louis Pichon made a trip up the Red River, explored the mining districts near Mong-tze and urged the building of a railway to Yün-nan fu.⁸¹ Soon after this came the great "Mission Lyonnaise," sent out by the Chambre de Commerce of Lyons during the years 1895-'97, which brought back the most elaborate reports about the commercial possibilities of the province and which contained plenty of geographical information besides.⁸² The magnitude and completeness of this great French mission completely overshadows the work of the modest Blackburn Chamber of Commerce mission in 1896 under the leadership of Consul Bourne.⁸³ The last memorable expedition which we shall have to record was headed by Prince Henri d'Orléans in 1895. Starting from Hanoi, he passed up the Red River to Manhao, thence to Mong-tze and Ssü-mao from whence he followed up the Mekong and at times the Salween rivers, past Ta-li to Atentsé and thence overland to Sadiya in Assam through the wild Mishmi hills. In the latter he and his companions nearly lost their lives.⁸⁴

From this time until the present, the books and articles about Yün-nan increase to such a degree that it would be almost hopeless to attempt to follow them. Moreover the information that they contain is concerned chiefly with the exploration of out of the way corners, or with the careful mapping of the already known portions. The reader is referred to the bibliography at the end of the paper for the work of the past thirteen years.

It only remains then for me to record what has actually been done by the French and English towards following out the various

⁷⁹ Clark, G. W., "The Province of Yün-nan," Shanghai, 1885; "Kweichow and Yün-nan Provinces," Shanghai, 1894.

⁸⁰ Bonvalot, G., "Across Thibet," London, 1891.

⁸¹ Pichon, L., "Un Voyage au Yunnan," Paris, 1893.

⁸² "Mission Lyonnaise d'exploration commerciale en Chine, 1895-1897," Lyon, 1898.

⁸³ Bourne, F. S. A., "Trade of Central and Southern China," Shanghai, 1898.

⁸⁴ d'Orléans, H., "From Tonkin to India," London, 1898.



FIG. 14. ENGLISH COTTON FOR YÜN-NAN ON THE ROAD BETWEEN TÊNG-YUE AND BHAMO.



FIG. 15. ROAD BUILT BY THE ENGLISH RUNNING OUT FROM BHAMO TOWARDS THE CHINESE BORDER.

railway projects made possible by the tremendous expenditure of time and money of which the preceding pages are a brief summary. In Burma a railway line was completed to Mandalay in 1889. Owning chiefly to their wish to develop the peaceful Shan states, but also with an eye to the possibility of continuing the line by the Kunlong ferry in Yün-nan (the route favored by Major Davies and his co-workers who know the ground more thoroughly than anyone else), a continuation of the Mandalay line was carried through Maymyo and completed to Lashio in 1902.⁵⁵ The "Yün-nan Company" sent out Major Davies, Captain Ryder, Major Manifold and other officers and men connected with the Indian Army to survey a route from the Kun-long ferry to the Yangtze, a distance of a thousand miles. In their report all possible alternative routes are discussed in detail and one recommended, which they calculate will cost between £15,000,000 and £20,000,000 and take ten years to construct. This is the first report based upon an actual survey of the entire route which has ever been produced—all its predecessors were based either upon a profound ignorance of the lay of the land or upon a more or less cursory examination. The most recent reports from government sources, however, indicate that the Burmese government will build a line from Bhamo to Teng-yue, a distance of 126 miles, a survey for which has been completed. In spite of the recommendations of Major Davies, they believe apparently that it will be easier to extend this line to Ta-li fu than the route by the Kun-long ferry.⁵⁶

The account of the splendid French achievement is drawn from the publication of the *Cie. Française des Chemins de fer de l'Indo-Chine et du Yün-nan* and the *Société de Construction des Chemins de Fer Indo-Chinois*, which appeared in April, 1910⁵⁷—a well-illustrated volume crammed with information. According to this account, ground was broken by the treaty of 1885⁵⁸ between France and China which provided for the opening of highways of traffic between Tonkin and China "pour rendre plus fréquentes et plus

⁵⁵ Davies, H. R., "Yün-nan," 1909.

⁵⁶ *The Far Eastern Review*, Vol. VII, 1910, p. 176.

⁵⁷ "Le Chemin de Fer du Yunnan," Paris, 1910.

⁵⁸ For all treaties and diplomatic relations see Cordier, H., "Histoire des Relations de la Chine Avec les Puissances Occidentales 1860-1900," 3 vols., Paris, 1901-2.

sûres les relations commerciales." The conception of the railway was officially elaborated by an inter-ministerial commission sitting in Paris in 1887, and comprised a railway in the Red River Valley and its prolongation to Yün-nan fu. This led to a number of reconnaissances, and to the detailed report of the Mission Lyonnaise. In 1897 a "Mission d'études" was sent out under the direction of Mm. Guillemoto and Leclère to survey a suitable line and make a geological and mineralogical study of the province. 1898 marked the formal concession on the part of the Chinese government, of the right to build a line from the border to Yün-nan fu, for which the Chinese agreed to supply the land. A private company, guaranteed by the French government and financed by the principal French banks, was formed and sent out another "Mission d'études" in 1899. The report of this commission was so disheartening that a readjustment of the control had to be effected, which placed the building of the Tonkin portion in the hands of the Tonkin government. The apportionment of the work was effected in a somewhat complicated manner. The government relegated the building of the entire line to a "concessionary" company, the Cie. Française des Chemins de fer de l'Indo-Chine et du Yün-nan, who sublet the Lao-Kai-Yün-nan fu section to a private company, the Société de Construction de Chemin de Fer Indo-Chinois. This private company proved that it could not get along very well unsupported and so was soon forced to go into "Liquidation amiable," after which it was able to do its work.

All this took place in 1901. The line first examined, through Mong-tze, Linan fu, Hsin-hsing chow to Yün-nan fu proved too difficult, so the first work of the new companies was to spend another year laying down an easier route, although one which passed through less populous districts. This new line left Mong-tze to the west, went through A-mi chow, Yi-liang hsien and so to the capital. This move caused a great deal of hard feeling, which resulted in a further delay, during which nothing was done until 1904. Besides the dissensions among the managers, the work had a great many local difficulties to contend with, lack of money, men and materials, and plague and pestilence in the unhealthy Red River Valley. Instead of 76,000,000 francs, the original estimate for the work, in 1908 it was found that 158,000,000 would be required to



FIG. 16. PRIMITIVE OX-CART IN THE CHAO TUNG VALLEY, EASTERN YÜN-NAN.



FIG. 17. A BROAD HIGHWAY NEAR TA-LI, CHÊN-NAN CHOW IN THE BACKGROUND.

complete it and get it into running order—a difference which hints at wasteful extravagance as well as legitimate expenses.

The line from Haiphong, on the Gulf of Tonkin, to Hanoi was completed in 1902. By 1906 the 385 kms. between the coast and Lao-kai was ready for work. Until this was completed, work on the Chinese section proceeded very slowly because of the difficulty of taking materials up the Red River which cannot be ascended beyond Yen-bai from September to June—and during the other months, even under the most favorable circumstances, boats would take twelve days to Lao-kai, while thirty was not an unusual number. The greatest number of men working at one time on the line was 50,129; 929 engineers, departmental chiefs and skilled workmen, all French; 1,200 overseers, mostly Italian, and 48,000 Asiatics, nearly all of them Chinese, with a few Annamites. These Asiatics died by the thousands in the unhealthy Red River lowlands.⁸⁹ The total number of men imported for the work was 60,700, chiefly from Chinese sources. Finally on January 30, 1910, the first locomotive reached Yün-nan fu from the coast, and the great undertaking was completed.

What the future will bring forth is hard to say. It is reported that the small increase in traffic over the new line is very disappointing to the supporters of the line, while on the other hand many are urging the continuation of the line to the Yangtze. The Chinese will undoubtedly take a hand in this however; they are reported to have engaged two American engineers to survey the line in 1909.⁹⁰

My task is finished. The era of "exploration" and pioneer work in the province is at an end—the era of economic and commercial development begins and soon the capital with its splendid situation, and Tali fu with its lake, snow mountains and historical associations will become as well known to the merchant and the "globe trotter" as Shanghai and Hong Kong. The light of western civilization has fallen upon another dark corner of the world.

⁸⁹ In 1907, when at the capital, I heard rumors of coolies dying in batches near Mong-tze and there was considerable hard feeling against the French among the Chinese who considered them responsible. The unrest showed itself the following year during the months from April to June when Chinese rebels attacked and captured the works at Ho-Kou, causing some damage. They were finally suppressed by Chinese troops from the capital.

⁹⁰ *Far East. Rev.*, Vol. VII, 1910, p. 176.

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THE INFLUENCE OF GOLD AND SILVER MINING UPON THE CHARACTERS OF MEN.

GEORGE D. HUBBARD, PH.D.¹

OBERLIN COLLEGE, OBERLIN, OHIO.

The results of the influence of the precious metals upon the character of men are intangible, immaterial, and evasive. Many factors have entered into the character of our Western men and Western society beside the influence of gold and silver mining; and other factors than gold are able to produce some of the results which come in response to its influence. The oil craze is similar to the gold fever. Other kinds of mining than gold produce some of the same effects, and any frontier life develops some of the characteristics found in gold and silver miners. Hence, it has been extremely difficult and sometimes impossible to arrive at conclusions that are at all trustworthy. For these reasons, it will not be surprising if, on some points, the author and reader part company.

The Gold Fever.—The "rush" has been described as a consequence of an excitement popularly called the "gold fever." This mania captured all classes of people, often making them oblivious of duty, forgetful of friends, and even of self and bodily comforts. The excitement in Georgia in 1829-1830 did not last long but was extraordinary. Professor Silliman² speaks of the excited state of men's minds and of the speculative spirit existing; and adds that facts were rarely reported correctly; and the public mind, being morbidly excited, was blinded.

In California, the stories of gold did not seem to enthuse the people; but, when in April the dazzling yellow metal itself was

¹This paper is a portion of a thesis presented as a part of the requirement for the Ph.D. degree in geography at Cornell. For other parts see *Bull. Am. Geog. Soc.*, Vol. XLII (1910), pp. 592-602; also Vol. XLIV, Feb., 1912; *Scottish Geog. Mag.*, 1910, pp. 449-466, and 1911, pp. 417 and 470; *Bull. Phil. Geog. Society*, Vol. IX (1911), pp. 1-22. Special thanks are due Professors R. S. Tarr, W. F. Willcox and H. Ries, of Cornell University, for criticism and suggestion throughout the whole work.

²*Am. Jour. Sci.*, XXXII (1836), p. 98.

brought into the streets of San Francisco, the fever spread, and the contagion swept through the State.³ Merchants and their clerks alike left the offices; lawyers, doctors, and even State officials went; soldiers and policemen deserted; whole ships' crews and officers abandoned their vessels when once within the harbor; farmers, ministers, laborers, and gamblers responded. The epidemic knew no social or class lines. During the first years, a kind of frenzy would seize a community; and thousands would rush away to some new and perhaps distant locality, where many would perish with disease or hunger, while the remainder returned in poverty and rags. They would leave localities of known value to search out a new one with no more provocation than a newspaper note.⁴

Gold was discovered in Coeur d'Alene placers of Northern Idaho in 1883 and produced the same enthusiasm; men surged in from New Mexico, Arizona, Colorado and California; from Minnesota, Puget Sound, Winnipeg, Assiniboine, British Columbia, and Dakota.⁵ When masses of gold aggregating 106 pounds were found near Bathurst, Australia, in 1851, and the news became public property, the greatest excitement prevailed. The *Sydney Morning Herald* of July 18, said "Bathurst is mad again. Men meet together, stare stupidly at each other and talk incoherent nonsense. The nerves of the community at large have received a severe shock." It has been the same in Alaska, Klondyke, Transvaal and West Australia, and from the beginning of gold mining down to the present. Gold in veins is much less effective than in gravel. Today, coöperation and the reduction of mining for the precious metals to an organized and capitalized business, remove the romance of gold mining, and of course cut off the excitement among the miners.⁶

It would be quite unfair to turn from the subject of gold fevers without mention of the effects on those left at home. The enormous migrations of 1849 and subsequent years tore many families asunder, leaving sad mothers, sorrowing wives, and neglected children with poverty and disappointment to combat; while he who had gone forth

³ Bancroft, H. H., "History of California" (1884), Vol. VI, p. 58.

⁴ Bancroft, H. H., "Hist. of Mexico," Vol. IV, p. 702.

⁵ Shinn, C. H., "Mining Camps; a Study in American Frontier Government" (1885), p. 255.

⁶ *World Today*, Vol. VIII (1905), pp. 178-185.

sometimes struggled with fortune successfully, but frequently sunk discouraged and diseased into an unmarked grave.⁷

Effects on Health.—While many left at home suffered from privation, the miner in the field and camp, contended with disease and very often gave up health, or even life itself, in his eager search. Literally thousands were stricken down while en route in the desert and mountain wastes, thus depriving families of their support and society of some of its strength. This was because of the distant occurrence of the gold and lack of proper food, water or shelter. The exposure to weather and to cold and ague by standing in cold water at work; the privations due to lack of food and shelter, and the irregularities induced by improper food, begot a whole crop of maladies, ague and chills, fever, dysentery, scurvy, pneumonia, malaria. Most of these are common in new countries, but exposure and vicious mining methods so weakened constitutions that these disorders were doubly potent. Drinking water from some of the streams gave diarrhea to 99 per cent of the men.⁸ Beside exposure, the mental strain of business life told on minds, as the insane asylums of the early years will bear abundant evidence.⁹

Character of the Miner.—Certain virtues and vices seem to have been begotten or nourished by the conditions in gold mining camps, or by the influence emanating from them. Self reliance developed (*a*) because anyone could succeed without a superior, and no one could afford to hire help; (*b*) because one had no time to help another so long as the latter could help himself. Balancing this independence, a fraternal spirit appeared, especially in the beginnings in the several fields; partly because of the isolation from home and the East; partly because of dependence for society and for sympathy upon neighbors. This spirit brought together men differing greatly in birth, education, and tastes, and welded them into something of a guild, a kind of free-masonry.¹⁰

Friendships and personal attachments sprang up between men of very different temperament and culture, because the conditions required that they work together, and gave them a community of

⁷ Bancroft, H. H., "Hist. of Calif.," Vol. VI, pp. 118-119.

⁸ Taylor, B., "Eldorado" (1857), pp. 206-7, 262-3.

⁹ Royce, Josiah, "California," Am. Commonwealth Series, pp. 392-3.

¹⁰ Shinn, C. H., "Mining Camps," pp. 133-290; Barry, T. A., and Patten, B. A., "San Francisco in the Spring of 1850" (1873), p. 8.

interest and risk. Men who crossed the land or the sea in company and worked in a gulch together held reunions along the Pacific Coast for many years. There was a cordiality peculiar to the conditions, a jovial fellowship which developed at the expense of ordinary forms of courtesy.¹¹

Gambling, drunkenness and improvidence were the greatest vices of the miners. Placer mining itself was, and is yet, a very good game of chance. It gave all the excitement of the game with the charm of the wilderness, and often added the novelty of a solitary independent game.¹² It brought familiarity with chance and created a desire to tempt luck. In the placer stages, gambling was mainly by means of games during the evening. It became very intense. The gold had come easily, and there was plenty more where it came from. Isolation from home and relatives weakened restraint; evenings were dull, and amusements lacking; therefore almost every-one played. When the veins began to be worked, the mining stocks and corporations appeared, speculation in part replaced the gaming table. Clerks and laborers as well as merchants and other business and mining men whose daily occupations were, at best, dangerously near gambling, and whose nerves were constantly tormented by unnatural yet, for the time, inevitable excitement and strain, entered into the sport fully as fast as their means warranted. Wildest speculation occurred, and individual as well as social disaster followed, even to the confusion of bankers and conservative Easterners.¹³ Gambling and speculation were not peculiar to the gold and silver mining industry; but they found therein fertile soil, because of the easy money at hand, the general excitement, the distance from relatives, lack of restraint, the hustle and self-absorption, and the intense desire to get rich. Cope¹⁴ calls attention to the waning of the spirit of speculation throughout the West because of the great changes since 1849 in the mining business. The large concern, with its capital invested in a fixed and elaborate plant, its ores of all grades, and its many mines consolidated under one immense organization, has much less to run chances upon. At present, mining and

¹¹ Taylor, B., "Eldorado," pp. 310 f.

¹² Patterson, R. H., "The New Golden Age" (1882), Vol. I, p. 253.

¹³ Royce, Josiah, "California," pp. 391-3.

¹⁴ *World Today*, Vol. VIII, 1905, p. 181.

extraction partake largely of the nature of a manufacturing enterprise.

Although drinking and drunkenness are very common, it is doubtful if they are more so than in other kinds of mining, or even in old settled and established communities. The predominance of men, the excitement and freedom, the abundance of wealth, and the social good feeling, which have been characteristics of gold mining districts all through the West since 1849, tend to foster this evil. The lack of restraint and the failure of the civil, social and religious organization to keep pace with the rapid development under the stimulus of the precious metals, make for lawlessness and liberty-taking, so that indirectly gold and silver share the responsibility. But a counter quality was developed in the mining districts. Great popular interest in civic order was taken by the mining and other population, because no superior organization dispensed that article; and order and security of property were much better than would be expected, considering the sources and heterogeneity of the people and the conditions under which they were living.¹⁵

Extravagance and its offspring, improvidence, were as natural fruits as the conditions ever produced. First, almost nothing could be had for ordinary prices; and, since one must pay exorbitantly, he felt that he might as well purchase anything that his pile could compass. Second, those who had gold, had come by it easily and expected to get much more before going home. Third, there was the novelty of paying ten prices for an article instead of one, coupled with the ease with which it could be accomplished. Men did not realize in those flush times and strange surroundings, the real cost of things. A few, unused to labor, whose daily ounce or two seemed a poor recompense for weary limb, sore muscles and flagging spirits, carefully hoarded their gains; but those whose lives had been mostly of work and privation (by far the larger per cent. of the miners) were open-handed. Impulse and whim had free rein. Men accustomed to no luxuries beyond a good beef steak and a glass of whiskey, now dined on tongue and lobster and drank ten dollar champagne. Oregonians were said to surpass all others in dietary extravagance.¹⁶ Yet there were men of culture in many lines who

¹⁵ Taylor, B., *loc. cit.*, pp. 101, 310-14; Shinn, C. H., *loc. cit.*, p. 287.

¹⁶ Taylor, B., *loc. cit.*, pp. 254-7; Shinn, C. H., *loc. cit.*, p. 139.

were careful, provident and regular, unscathed by the violent temptations to recklessness.

The influence of gold when taken from the natives or mined by oppressive slavery in Mexico and South America, seems to have had quite an opposite effect. There, avarice and greed developed enormously; but in the United States, where every man was his own miner, and had to lift the treasure by his own strength or skill, these qualities seem not to have taken root.

In any study of the personal character of the miners of the West, it is necessary to take into account the liberal variety of men upon whom the influence of the precious metals, with other factors, had to work. The miner came from the North, the South, the East and West, from Europe, Asia and Latin America, from home and from prison, from farm and town, shop and ship; he was raw or cultured, ignorant or educated, boisterous or gentle, stupid or alert, red, blonde or brunette. All types were cast together with their multitudinous personal differences. Some of these initial qualities were lost, some were transformed, developed or dwarfed, and new or dormant qualities were brought out. Some of the changes were due to change of environment; some due to the frontier nature of the region; some directly due to the influence of gold and silver, and some indirectly traceable thereto. And from it all, there developed a species—the typical Western miner; a variety—the prospector; and in general, a social character, and a basis for the present tone and character of the citizen and of society in our mountainous Western States.

Following a well-recognized law—man is the product of his own environment into the condensed and crystallized effects of all environments previously occupied by himself and his race—one would not expect all who have had contact with the production of the precious metals to be alike, but he might feel confident that they would have certain common well-marked characteristics—a common factor. After reading many character sketches, descriptions of camp and western life, and estimates of men and society in the West, the following summary has been made,¹⁷ embracing some of the personal characteristics of miners.

"Besides books mentioned in other references in this paper Bret Harte's stories and poems of western life were examined; also works of Joaquin Miller, Josiah Royce, and J. D. Whitney and others.

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1. Hardy; because selected and hardened in a severe life, out of doors, subject to weather and privation.

2. Generous; because right at hand were the means, also the opportunity to share, and many chances that he too would soon need another's aid.

3. Careless and reckless; because of the chances constantly run for success or failure, because of association with other gold-cultivated reckless characters, because of the distance from home and lack of family ties, and because of general excitement.

4. Happy and hopeful; because of excitement, many chances of success, constantly hearing of others' good fortune, and necessity of outdoor life.

5. Brave, because only the stronger spirits started, and these were sorted again en route and yet again continuously in the gulches; because of isolation and vicious associates with no defence save his own.

6. Self reliant; because of ease of success without aid. No one had time to seek or give counsel or assistance unless needed.

7. Exuberant with life and push; because mostly men, young and selected, successful, hopeful, and in new untried conditions.

8. Resourceful; because driven to it by circumstances. Devices must be made, and experiments conducted to find best adapted machines and methods.

9. Orderly, and loyal to order; because under the conditions he could have no order unless he helped to make it; and it must be had, if at all possible. He demanded fair play; honest himself, and exacting justice and honesty in others.

10. Impetuous and hasty; manifested in duels, trials and executions, and in snappy decisions on courses of action. In the former cases, a delay meant an escaped offender. There were no prisons and no time to stand guard. In the latter case quick decisions brought best results.

11. Aptitude and adaptability; power to adjust and to grasp opportunities. This quality was specially nurtured in the mining camps because of their evanescent nature and the constantly changing conditions and associations. It developed in individuals by virtue of a natural selection process. He who adjusted himself to new conditions had a much better chance of success.

Rarely do wholly new traits of character seem to have developed.

but abnormal growths of certain qualities and dwarfing of others, thus producing an unsymmetrical character are common.¹⁸ Elements of character most unlooked for would spring up in a man and come to fruition, before his acquaintances or friends were aware even of their existence. Men would indulge in dangerous or frivolous excesses, when they had formerly been temperate. They would be greatly given to drink, generosity, talkativeness, and jesting. Taylor considers these excrescences, "rank wild shoots slightly weakening the trunk, but signs of the abundant life."

The Speculator.—One or two special types of character and occupation deserve special mention at this point. When stocks and companies came into vogue, and men cared more for speculation in stocks and properties than in gambling machines; the speculator evolved from the proprietor of the gaming table, or he developed from a miner who saw riches in the enthusiasm of his fellows. He is a product of the printing press and the credulous gold seeker. His whole business in this connection has to do with gold mines, real or fictitious, and with a quality in men called forth or developed under the influence of gold. He booms a mine, sells properties or company shares, and pockets the proceeds, leaving beautifully engraved certificates in the hands of his purchasers. He is the eloquent advertiser of modern times; one who induces others to speculate in gold mines, which have little value outside their Broadway offices and embossed certificates.¹⁹

The Prospector.—The prospector is undoubtedly the most typical human product of the whole gold and silver mining business. Men rarely began mining with the expectation of becoming professionals. but many of the more adventurous found themselves, at the end of a year or two, well within the meshes of the web, and then, unconsciously perhaps, surrendered themselves to the lot of a prospector.²⁰

Equipped with shovel and pan, blanket, skillet, matches, a gun and a knife or two, far too careless of food and personal comfort, utterly oblivious to vicissitudes of the elements, beyond the ken of man for months, roved the adventurous, restless, professional prospector, dreaming at night of nuggets and heaps of gold, and

¹⁸ Taylor, B., *loc. cit.*, pp. 254-57, 310 f.

¹⁹ *World Today*, Vol. VIII (1905), p. 179.

²⁰ Patterson, R. H., *loc. cit.*, Vol. I, pp. 239, 253-4.

burning all day with a thirst for gold which gold only quickened and never quenched. He lived on wild game, berries and anything procurable, paid little attention to health, sought solitude and seclusion, was worth his thousands one day and nothing the next, usually a keen observer, grizzled, poorly clad, brave, hardy and careless.

The prospector was the advance guard of the miner. He wandered away from the camp, up ravines and over divides, picked at the gravel here and there, washing a bit in his shovel or pan, then peering in for "color," the measure of his success. Thus he passed the snowy mountains, and crossed the burning plains, becoming nomadic, moving on unverified report, and circulating news of his various finds. Unless the prowling Indian, dysentery or starvation accomplished the deed too soon, old age crept in and took him unawares, and his wasted body or bleached bones were left to mark some lonely gulch or sentry hill. His hoarded dust in leathern bag sometimes revealed his business, when regathered by another solitary prospector who happened by the deserted wealth.²¹

His type is a minor element in the exploitation and development of the West today. He works alone, unguided and, in the main, unfollowed, unless in the employ of some great concern where both he and the mining expert contribute to the expansion of the enterprise.²²

Effects on Western Business and Social Life.—Many personal qualities of the miners discussed above were so common as to be more or less crystallized in society, and others still more universal aided in giving the characteristic tone to western society. Royce points out that in the early days there was in California a blindness to social duties and an indifference to the rights of certain foreigners.²³ This latter was noticeable concerning the Mexican "greaser" and the Chinaman. The all-absorbing personal ambition to acquire gold, and the carelessness, overhastiness and extravagant confidence in luck, which seems to be largely gold-born, were certainly in great measure accountable for this early lack of the normally very prominent pioneer characteristics, thrift, sociability, promotion of the

²¹ Patterson, R. H., *loc. cit.*, Vol. I, p. 245; Bancroft, H. H., "Hist. of Calif.," Vol. VI, pp. 385, 390, 391.

²² *World Today*, Vol. VIII (1905), p. 181.

²³ Royce, Josiah, "California," p. 2.

social organization, and affiliation with everyone in the community, even though his nationality, or skin, be of different kind.

Later, men becoming aware of social obligations took up with the usual zest and energy the task of building a well-organized, permanent and progressive society and State. In many parts of the West, the first few years witnessed the conditions noted in California, and later years have seen a similar change.

Peculiar business methods grew up and flourished in California during the first few years of her Golden Age. Extraordinary abundance of metal made it possible to pay all debts punctually, and a public spirit unfolded which was opposed to slackness.²⁴ Men were forced to have business confidence in each other. Business was transacted on a large scale, and the market was so absolutely sure that the ordinary solicitation and attempt to reduce the price were almost entirely forgotten. The merchant became indifferent as to whether the customer purchased or not; he was sure of a speedy sale anyway. And the customer bought if he approved the price, or really wanted the goods; if not, he went away. Usually he paid the price without a word. So flush were the coffers that men loaned money without security and many times without even a note, suffering little or no loss.

These general conditions continued for ten years, until business began to settle into more secure routine. Then those who continued to display the same indifference to purchasers or to loan without note and security were forced to the wall. Competition rose; the transient regime entirely disappeared; and with its removal many a business man, failing to adjust with sufficient alacrity to the new conditions, went into bankruptcy. Much of the same results were found in Australia during the period of great abundance, and were followed by similar subsequent change.

Beside these abnormalities in trade, many writers mention an exuberance in everything, which manifested itself not a little in business and enterprise. Men were possessed of a spirit of hustle, due, in part at least, to success and to the bountiful resources and ample opportunity.²⁵ Caution and prudence seem to have been thrown to the wind, and yet men prospered. This spirit was propagated

²⁴ Taylor, B., "Eldorado," pp. 59-60.

²⁵ Bancroft, H. H., "Hist. Calif.," Vol. VI, p. 225; Taylor, B., "Eldorado," pp. 310-314.

wherever the new gold went, and there resulted a quickening of enterprise, an intensifying of prosperity, an augmented productivity until Hume²⁶ remarks "In every kingdom into which money begins to flow in greater abundance than formerly, everything takes on a new face. Labor and industry gain life, the merchant becomes more enterprising, the manufacturer more diligent and skilful, and even the farmer follows his plough with greater alacrity and attention."²⁷ Increased gold and silver production seems to be not only a local stimulant but a universal industrial tonic, vivifying enterprise as far as it goes.

A characteristic quality of Western society has been its lack of rank, its democratic equalization. Taylor predicts that California will be the most democratic country in the world. This democracy was due to a number of conditions. (1) The richest never came to California nor to the other mining regions, and the poorer could not come, so the financially determined social range from the start was less than in the East. (2) Those who came all worked, worked side by side, and at the same or similar occupations. (3) None could afford to hire or be hired. (4) Where riches lay so near the surface, they conferred little advantage.

In the course of time, as mining methods have changed, financially determined social rank has arisen. There are laborers and capitalists in two well-established classes. This distinction could not well have come in an agricultural pioneer community. It is little known in new countries other than those mining gold. In the East, property plays a part in social organization, but position, scholarship and culture are stronger factors. It is no wonder, however, that in the West and especially in California, many of the citizens know no aristocracy save that based on wealth, and that by many the clergyman or professor is not to be considered eligible to the best society unless backed by his gold. Oregon and Washington, less important as mining States, seem to feel this distinction less.

Gold and silver mining brings men closer together physically and thus creates links of town-life and society.²⁸ In spite of the strong

²⁶ Hume, D., "Political Discoveries," 2d edition, p. 47.

²⁷ Stirling, P. J., "Gold Discoveries and Their Probable Consequences" (1853), pp. 256-7.

²⁸ Shinn, C. H., *loc. cit.*, p. 227.

individualistic spirit in mining communities, there is a real charity and a healthy fraternalism not known or possible in other kinds of frontier life.

The Camp as an Organizing Force.—As an organizing force, mining-camp society is one of the strongest and quickest to act. This has been shown in the case of court organization, and was specially marked in the massing of men in orderly concourse to discuss and carry into effect district organization. Popular discussion was a right of miners, growing as naturally out of their environment as did equal mining rights; and assembling with startling energy and swiftness for effective consolidation was as much to be expected as hasty trial and execution. The miner saw the need of order, because he was removed from its protection; and, under the tremendous pressure of local demand for unification of all forces, he became bound to his fellows by common interests into a social compact owing allegiance to no higher authority. The evolution of social community when begun was much more rapid under the influence of gold than it could have been among a more staid and less mobile populace.²⁹

In discussing the characteristics of men in mining regions, Shinn, writing in 1884, remarks that they are a class peculiarly ready to assemble for free discussion, to have debates, to start arguments and to listen to stump speeches.³⁰ The early training of miners' courts and of camp life have left their impress upon the people of the mining regions. Compared with the people of the valley engaged in other occupations, they bear relations similar to those born by Tennessee mountaineers to the valley dwellers of the same vicinity. But these mining mountaineers compared with the ordinary mountain dweller, have a closer organization, a more constant habit of seeking each other's counsel, of meeting in assembly, and of openly discussing local and general affairs.

Spread of Camp Spirit.—The mining camp spreads its influence with the wanderings of prospector and miner. It was as much a unit and centralizing force in the West as the town in New England, and the plantation in the South, and fully as much a product of the environment. Institutionally, it underlies the Western commonwealth; intellectually and socially, it represents a colonial era; but

²⁹ Shinn, C. H., *loc. cit.*, p. 135; Taylor, B., *loc. cit.*, pp. 310-14.

³⁰ Shinn, C. H., *loc. cit.*, pp. 226-7.

in both respects, it is a type not found in merely agricultural or pastoral development, but belongs to the production of the precious metals. Not only has the camp and mining district life given its strength, energy and manners to western society, but it has already passed as a powerful force into the very fiber of the social fabric throughout the western mining States. Men and women trained in that atmosphere are in control of the departments of state and local government, are leaders in society, and while the whole organization of state and society is similar to that in the East, its movements are quicker, its pulse healthier, and its jurisprudence more primitive, its spirit of unity stronger and tone more democratic.

Oregon has the name both at home and among its neighbors of being the least progressive of all the coast states, although it was one of the earliest occupied, having its permanent settlements before the California gold discoveries. May this not be in large measure due to its lack of gold and silver mining and of contact with mining life? A comparison of Seattle, Portland and San Francisco is also striking. We have seen the character of the latter. Seattle is said by travellers to resemble Chicago in its hustle and push. Portland is much less active. It is an agricultural market but has little contact with gold mining, while Seattle has, besides agricultural and lumber marketing, an extensive business in outfitting Alaskan and Klondyke miners.

Effects on Other Institutions.—In the beginnings of the development of the various districts, certain institutions were slow of growth because neglected for the Western *summum bonum*—gold. Perhaps the slowest was the church and with it religious life. All writers pay a tribute to the miners when they speak of their reverence for religion, their emotions and responses in cases of births and natural deaths. Probably much of this feeling toward spiritual things was due to the scarcity of church and religious influence, which in turn was a product of the conditions. Certain institutions must reach a community last, and these will be determined by the relative importance attached to them by the members of each community. Naturally, where the material interests were so clamorous for attention, their importance was magnified to the detriment of the spiritual.

It is also common testimony that the Westerner today has a very high regard for and interest in the church, religion and education.

Probably this is a development of the earlier feelings, coupled with an increased desire to have for his youth what the exigencies of the times forbade him to enjoy.

On Literature.—Books, articles and stories in considerable numbers have sprung from the Western conditions, but as yet there is little that can take rank as literature. A swarm of little, cheap, and often loud books by persons who had spent "three weeks" to "six months" in the gulches came up as spontaneously as mushrooms after a June shower.

The scientific literature is no small item. Thousands of pages along many lines, geologic, petrographic, chemical, mining and engineering have been published in books and journals. Many volumes of more or less technical reports annually appear. Much of the western fiction is gold inspired. In the gulches was found not only the pioneer conditions attractive to all readers but also a romantic, novel background set with gold nuggets, pious gamblers, forgotten forty-niners, tricky Mexicans, Indian outlaws and rescued innocents, all possible and all thrilling. A thousand stories such as those by Bret Harte illustrate the spirit of the times. Cincinnati H. Miller (Joaquin Miller) in his poems has depicted the mountain scenery, open-air life, and freedom, often lawless, of mining days; and other lesser men have written, yet the total is but meager.

The great mining West has a treasure house brimful in her romance and history; an inspiration in her scenery for the outdoor poet; a theme for the dramatist in the vivid life scenes of the overland routes, her mining camps and forests; a sublime symphony for the deft fingers of the artist to express in music of poetry, song, or story:

The masters of these themes will be products of the environment. They will grow up in the grandeur and vastness of those majestic mountains and profound valleys, opened to the world by the far-reaching influence of the metallic treasure in their hearts and mantles. Men of spirit and strength have already written, but the best from this virile, exuberant and cosmopolitan people, in a new and varied country, is yet to come.

The Commingling of Races.—As already shown, under the influence of gold and silver there were drawn to the West and especially to California, all nationalities and conditions of society. The mass of population was most heterogeneous and unpropitious, yet there

"is growing up" says Taylor, "harmony beyond the most sanguine hopes."³¹ This resultant, save some very local foreign examples, the most cosmopolitan of all societies, was not alone due to the variety of its ingredients. Commingling races and interbedding social strata, coupled with primitive and similar modes of life for all; the most perfect mixing process carried on by means of characteristic rushes; the common risk and responsibility, have all collaborated to produce the finished product—Western cosmopolitan society. Much of the virility and enterprise in California is a consequence of the complexity of population and its complete mixing. And by the same means, the citizens, facing the awakening Orient, were prepared to enter broad world relations.

World-wide Results.—There were broader social effects, responses to the influence of gold and silver in the Far West. The gold seeker's emigration from all the world was socially a disturbing influence touching the spirit of the times in many lands. The discoveries and exploitation of treasure called forth hordes from quiet, steady civilizations, relieving congestion, quickening markets and reviving life, thought and action. There was a loss from many lands and communities of capital and strong arms, to a new, wild, and untried country.

Society in the aggregate suffered by loss of moral restraint incident on mining life, and the consequent vice, crime and bloodshed, gambling and thriftlessness, and the partial loss of mental equilibrium. And so the subtle influence of a very potent element goes on permeating, enthusing, restraining, inducing, discouraging and cheering, and all the time preparing the way for speedy emergence of the Great West in its strength and integrity.

³¹ Taylor, B., "Eldorado," pp. 101 f.

THE TRUE ROMANCE OF PANAMA.

THE HUMAN ELEMENT, IN THE EARLIEST EXPLORATIONS AND THE
FIRST SURVEYS FOR AN INTEROCEANIC WATERWAY.
(Concluded.)

FULLERTON L. WALDO, F.R.G.S.

THE NICARAGUA ROUTE.

The earlier history of the Panama Canal is not complete without some reference to the great alternative route. Perhaps the classical memoir on the subject of the availability of the Nicaragua route is that of a former president of this society, Angelo Heilprin, whose paper, "The Nicaragua Canal in its Geographical and Geological Relations," was published in the *BULLETIN* of March, 1900. His adverse conclusions were very seriously considered in making the final decision against this route; Senator Hanna said it had changed his views and his vote.

The Maritime Canal Company sent out eight surveying parties in Nicaragua from 1887 to 1888. Their last party was withdrawn in 1891. Borings were continued until 1893.¹ Work was stopped in 1892, when the company found itself in financial straits—the kind of straits that hinder, rather than promote, canal projects.

Here is a bit of enlivening description, just about as it was hastily scribbled down, from the manuscript note-book of an engineer who served under the Maritime Canal Company in Nicaragua. It is introduced as affording a vivid glimpse into the every-day working life of the typical engineering explorer.

"The camps of the explorers in their simplest state were modelled after those of the rubber men and hunters—a lean-to made of a frame of poles tied by the vines that were ever present and shingled with the very large leaves of the wild banana. Under these roofs were placed the beds of poles on notched sticks. Such an arrangement served very well where the stay was quite

¹Report of the Nicaragua Canal Board, 1895 (House of Representatives Document No. 279), p. 22.

limited, and was usually put up at the end of each day's march on a reconnaissance, but where a longer time was to be spent in a radius of 4 or 5 miles a more pretentious camp was prepared with a clearing to prevent trees falling on the shacks. When leaves were scarce, sometimes the roof was thatched with the long fronds of the 'selico' palm split down the middle, and laid parallel to the ridge pole. Roofs well thatched and cared for would last several years, but were an abiding-place for all kinds of insects and even snakes. An exciting incident occurred on account of these unknown partners of our habitations. A party of surveyors were busily checking and copying their notes after supper, and at the conclusion the levelman tilted back his stool with a yawn and stretch, to be startled with the sight of a snake suspended within a few inches of his face. His yell and fall over backward aroused the camp into action, and to the accompaniment of a fusillade of pistol-shots the snake dropped down through the poles of the floor, and no doubt vowed to stick to its legitimate business thereafter, instead of prying into the secrets of surveying.

"The young boa-constrictors, domesticated by the natives, are used as rat-catchers, sleeping in the thatch in the day-time, and chasing rats over the sleepers with but little notice from them at night. Such a pet was kept at Camp Menocal of the Maritime Canal Company, and lived happily with the gang of natives until an ignorant American saw a chance to distinguish himself, and killed it, much to the disgust of the natives.

"The life of an engineer on a survey was usually very strenuous. About 4 A. M. the native cook, roused by his alarm-clock, would start his fire, and by daylight the simple meal of hard-tack, some meal, bacon and coffee was ready, and the officers ate in their pajamas if their clothes were wet. With a warm meal inside, one did not dread cold wet clothes so much. In the early days of the Maritime Canal Company, at the permanent camp closed dry houses of palm were built, and the clothes dried by Sibley stoves, but through the neglect of the negro attendant in sleeping, they burned down with all contents, and their use was discontinued. For, strangely enough, no ill effects followed working in the swamps and rain with one's clothes never dry, except when a change was made, for months at a time during work hours. While in camp pajamas were used, and often mosquitoes were so numerous and vicious that



THE PANAMA LOTTERY.



MRS. JOHN F. STEVENS' TEA-PARTY, CULEBRA, NOVEMBER, 1906.
(Mr. Stevens was then Chief Engineer.)

the men had to retreat to their mosquito-bars and do the work on their notes and maps. It was like running the gauntlet to get out for meals. Lunches of hard tack and tinned meat were carried into the field each day. Often a gun taken along secured enough turkey or pig meat for a much appreciated variation from meat in tins. Fish were abundant in the streams, and were often secured by hook and line at leisure intervals, or by the more destructive dynamite. The native helpers soon tired of tinned meat, and would beg us to kill the brown monkeys for them, which meat they very much preferred to the 'embalmed' beef. It must be confessed that many of the Americans coincided with them, after breaking through prejudice caused by the human look of the skinned carcass. The Costa Rican garrison at the Boca Colorado detailed men, and we often had several monkeys hanging up.

"We had little time in camp except Sundays, which were usually devoted to personal affairs, a general washing up, mending, etc. On account of the abundant rain, corduroy roads around the camp were necessary to keep above the mud. There usually was a bountiful supply of provisions all tinned up, and many delicacies were decidedly inappropriate for the tropics. Rice cooked with coconut-oil, native beans and plantains, all of which could be secured in the country, were a splendid diet for workers, and had no deleterious effects, but cornmeal which was forced on us by the ton by some red tape official whom we could not reach was too heating, and rather roused the ire of the natives, and even the officials with the result that it was stored away [the words *to rot* are crossed out]. Plum pudding, six different kinds of cheese, and various jams rather tended to clog the intestines. . . .

"Much has been said in regard to the precautions that should be exercised to avoid the miasma that produces the fevers, but few people ever seemed to observe them. Usually the persons who draw up regulations have little experience in carrying them out. In the first expedition of the Maritime Canal Company there was an elaborate general orders prescribing conduct, among which we were to have 'coffee' under our mosquito bars in the morning with breakfast in the field at 11 A. M., and supper at 6 P. M. This did not last long, as we nearly starved, which was worse than malaria, so we got down to regular meals and had none of the predicted ailments. It is probable that it would be advisable to avoid the

miasmas which are present after sundown, at least with an empty stomach, and as it has recently been discovered that certain mosquitoes peddle the germs of disease, it would be well to have mosquito-tight enclosures after nightfall, when these pests are most energetic, and perhaps to protect the hands and feet as much as possible when at work. It seems, however, that people of robust health and of good habits on the Isthmian Canal surveys in spite of swamps and wet clothes rarely suffered much from fever. While working in the vast swamp regions of the San Juan valley, we from necessity drank the swamp water. All, however, suffered a general falling off from the active energy of their northern homes, usually about 50 per cent. in about a year. The continuous heat, with the lack of the changes of seasons of the temperate zones, is very enervating. This enervation affects not only the physical but also the moral sensibilities. Of course much of this latter influence is due to the usual lax social system, and few of the young men who went on the canal surveys escaped moral contamination, which affected their after lives very viciously, but their associations had not been with the best class of society.

"Foreigners find the entrée into this [society] rather difficult, and there is little compensation. There was little common ground, and calls were rather perfunctory and strained. The young ladies of the household had rather a limited education, and very few ever traveled beyond the limits of their own village. In calls we met the whole family in the reception-room, the ladies ranged along the far side of the room, and we on the other. At the balls a similar arrangement was also observed. The orchestra was usually of the wild native type of stringed instruments, and the tempo very poor. The order of the dances was similar to what we had known at home, but we never made much of a success at the square dances, with their extravagant posings, although the señoritas were very graceful in them. At the waltz we did fairly well, although they danced the old style hop instead of the later glide. Their mazurka, however, was another puzzle. Very little conversation was possible during the dance, and at its conclusion the señoritas went back to the grim vigilance of their duennas and the men to their corner.

"This recalls the scenes, amusing to us, of the native courtship. The windows of the lady's castle were grated, as of old, with iron bars. Usually early in the morning we would find the favored



CRISTOFAL BASEBALL TEAM.

cavallero beneath the window with uplifted hat and beseeching prayers, which would go on for months without any notice from the fair one, although she may favor his suit. This to us was very amusing, and the comments and amused looks were rather aggravating to the agonized Romeo. After a proper period of constancy the father of the fair lady would invite the favored suitor to call, and then he is permitted to see the fair lady across the room with all the family present. In future calls as the courtship progressed, fewer of the family would be present, until only the 'duenna' remained; and the young couple never were alone until after the marriage, when the surveillance of the mother ends and is transferred to the husband. The eye of the young wife is usually freer than that of the maiden, although from our standpoint the lives of the women were restricted to the home and the church.

"The padres [priests] of the country in their rusty black garb were very much in evidence in the cities, but their education seemed very limited, and the smattering of Latin which enabled them to drone out the prayers seemed their whole stock in trade. The blind devotion of the people to the church and the subjection in which it held them always seemed surprising, as the derelictions of the would-be apostles of the church were at times painfully in evidence. If one expressed surprise at these things to our well-educated native friends, the usual answer was that the church censor had not been along for a long time; yet while they recognized the errors of their clergy, they made confession and received absolution of sins from the priest as a direct agent of God with blind devotion.

"It was impossible to see multitudes kneel on feast-days to what these men represented, content if they could but kiss the footsteps or garments of the higher dignitaries. At Greytown, during the work of the Maritime Company, we saw each year a crude representation of the Passion Play, but the actors did not have the blameless lives of the Oberammergau production. A gambler we well knew took the part of the chief actor. Judas Iscariot was literally as black as painted—a coal-black negro, usually drunk, no doubt to deaden his sense of the impersonation. The thieves on the cross did not belie their character, and the disciples were a mongrel crowd. The crowd sometimes got rather real as persecutors of Jesus, so that he lost all meekness and protested in somewhat violent language. The grand finale at the crucifixion usually was rather

grotesque. The characters were lifted up to stand on the cross with outstretched arms, and the way cleared for the repentant Judas. This was a great chance for the usual kodak-fiend, and it invariably roused the ire of the natives, but they could not be reached among the crowd of Americanos. It is related that at the crucifixion of 1890 one of our machinists called Paddy was an interested observer, but ventured the remark loud enough for the chief actor to hear that 'sure, he niver knew Jaysus was a naygur'; which that character resented by inviting Paddy to wait until he got down, and he would show him if he was a nigger. Many other grotesque incongruities were noticed by the critics or scoffers. Once some of the employees of the Navigation Company rigged up some of the Roman guards with plug hats and grotesquely painted sticker coats and old rubber boots; but the natives were much impressed.

"The members of the survey-corps did not get into town very often, and when they did the machetemen invariably got on a drunk and were hard to start out again. It was rather a comical sight to see an engineer trying to round-up his crowd of bibulous natives. The only way was to take them along as fast as caught and not lose sight of any. Often he had to load the semi-conscious ones in the bottom of the canoes, but once on the way they were very tractable. With a machette or paddle the native laborers were excellent, but they proved of little value either at Nicaragua or Panama in excavating or other hard manual labor. Besides, they will not work but for a short time, and in our first experience with them we found their usual excuse for a day off was a saint's day. It seemed to us after a while that every day of the year was devoted to saints, and that at times they had bunched several saints on one day. We finally had to draw the line on their idleness, and have them bunch all their saints on a few days, which worked fairly well. All our laborers did on saints' days was to avoid work [the words *but not liquor* are scratched out]; they dressed up and usually got drunk if possible. The supply of native labor is very small, not sufficient for the cultivation of the few farms, and will not be a factor in canal-construction. Colombia has the peon laws, by which a native in debt is practically a slave to the creditor until he works out his indebtedness. By clever manipulation the creditor will usually keep a good laborer in his debt as long as he pleases, and at his death the debt descends to his children. A creditor will often sell



CULEBRA CUT FROM CONTRACTOR'S HILL. LOOKING NORTH. APRIL 20, 1910.

or farm out his peons and draw their wages. This buying of contracts was about the only way to get labor for some of the surveys. We were often bothered by impressment of our laborers for military service in the ever-active revolutions. It was not a patriotic sight to see the press-gangs bring in the volunteers all roped together, barefooted, ragged and dejected. An official in Nicaragua from whom the government wanted more soldiers sent back the laconic reply to send more rope. Once enlisted, however, the embryo soldier seemed resigned to his fate, and would be a very effective soldier if, as but rarely happens, he were properly officered,—being docile, brave, easily fed, capable of enduring great fatigue and hardships.

"As there is no proper hospital service, the sufferings of the wounded after a battle are terrible, but they bear them with great resignation, and often make miraculous recoveries. The ordinary soldier knows nothing of the merits of the quarrel for which he fights, and is usually indifferent. . . . A revolution . . . suits the native fairly well. The loss of life is usually nominal, and it gives the excitement which their character craves, and after all, as a wise old man remarked, 'Why, it takes the place of the theatre at home!' This complacent view of it is all well enough for the native, but rather rough on the foreign merchant and investor, who usually has his business ruined, and—until lately—without redress. The United States through the Monroe Doctrine has stood in the way of a proper policing of these countries, and has shirked doing it herself. By it the vast commercial interests of the foreign investors are at the mercy of the fickle and unstable governments, and the prosperity of the country is indefinitely retarded. Life and property are not safe, and a mere travesty of justice exists except where England has her colonies."

An account of the methods by which the surveys were conducted in the field will be found in a memoir of Mr. Boyd Ehle,² an engineer well acquainted with the physical features of both of the principal trans-Isthmian routes and sometime in command as acting chief in the Culebra Division at Panama. The engineering force included a chief engineer, division engineers and assistant engineers. The assistant engineers were sent ahead to reconnoiter.

²"Problems and Methods of the Isthmian Canal Surveys." Reprinted from *Transactions of the Association of Civil Engineers of Cornell University*, Vol. X, 1902, p. 88, etc.

Each assistant was in charge of a party; a small surveying-party would be composed of eight men with machetes to "tunnel" through the undergrowth, a level rodman, two instrument men, two Chinamen, a cook and his helper. "Surveying in the dark" it has been called. A surveyor who was with Peary in the Greytown swamps on the Nicaragua route has described the country as one vast "hot-house." I told him I had found the word "tunneling" used to describe the progress of earlier surveyors through the intricate undergrowth. He said "That's exactly what it is. I never heard the word used before, but it just hits the nail on the head." The Nicaragua parties planted stakes along a line, 100 feet apart. At the 100-foot intervals, there were branchings to the sides. Nothing could be seen beyond and outside of the cuttings. "When we came back four or five months afterward," said the surveyor just quoted, "the green stakes we had planted had taken root and were putting forth sprouts." A conscientious engineer who did not simply stay in the tent assembling the data collected by his subordinates, as some engineers elected to do, found his strength, courage and perseverance tested to the uttermost. The incessant rain of the swampy region along the eastern shore of the Caribbean near Greytown is described as being most depressing in its effect upon the animal spirits. Of course in the effort to find the lowest level, much of the survey-line had to be run through swamp-land.^a The men came back to camp from the day's work plastered from head to foot with black mud and fairly soggy with being rained upon. There might be a fire, but not enough to keep a quantity of rain-soaked blankets dry. So they rolled up in wet blankets and slept wet, as they had been working wet all day. There were no camp-fire gatherings with song and story; everyone was too tired for that. "We were grouchy all the time," the man who was with Peary said to the writer. "You've no idea what its like, not seeing the sun for months, and rain, rain, rain all the time! And the boils! Some of us were laid up for days with them. I had one on my knee, and every step was agony. We drank swamp-water the color of coffee. The mosquitoes would be in masses on the backs of your hands as you worked with the instruments. You got used to them by and by. There is a kind that lays eggs under the skin, and if you let it go, presently there's a boil that has to be cut out with a knife. Mos-

^a See Ehle, p. 82.

quito-netting was no good. You got into your bunk with cheese cloth curtains drawn around you, and killed all the ones inside, and the ones outside, all night long—my! I can hear them singing yet!”

“And Peary?”

“Oh, Peary was a wonder. A great man to get work out of men. They knew he wouldn't ask anything of them he wouldn't do himself. You know, there are quaking bogs down there, to cross which is like walking on thin ice. We'd sometimes lay down the thick, broad leaves of palms as a man would use skees or snowshoes, and support ourselves with poles. Well, I've seen Peary, gun over shoulder, bob down clean out of sight in a mud-hole in such places, and bob up serenely and go on as if nothing had happened.”

Sometimes the native helpers, filled to the brim with their mad-denying native concoctions, would “run anuck” flourishing their machetes. And soldiers of the Spanish-American war can testify as to what a dreadful edged tool a machete is at close quarters. It is the most indispensable portion of the surveyor's outfit. Get the machete away by hook or by crook from the man that has it, strap him down, and feed him with morphine pills,—this seems to be the recognized mode of dealing with the man crazed with the fiery “aguardiente.” It was not a pleasant job the writer of the manuscript notes once had on his hands at Panama. The native overseer had gone away and left him and one other white man to supervise the work of some two hundred and fifty Jamaica negroes. The black men got “ructious” in the night, at their quarters. Quarrels spring up quickly in Spanish America. When the engineer got down to the big building where these hulking fellows were bunked, he found that they had taken their shooting-irons and lanterns to bed with them. He let them alone that night. The next day two or three turned up at the door of his tent and demanded the pay-checks for the crowd.

“But your foreman is not back yet. You can't have them.”

“We will come in and take them.”

The engineer drew himself up to his full height (and he is a tall man), and looked them in the eye. His own eyes are blue, and twinkle pleasantly. “If any one of you crosses the threshold of this tent,” he said, “I'll kill him. *Do* come in!”

The natives muttered, looked daggers, and withdrew. A short while afterward they were seen trudging off along the railway-track

in the direction of Panama. Later they were caught, tried and punished for mutiny. They never got their pay.

Upon passing in review the results of the various surveys that have been made—and we have told the human story of only a few of the more important explorations, omitting entirely the technical details of the abandoned Nicaragua enterprise,—one general result is clearly apparent. The selection of routes was practically narrowed down to a choice between the two styled respectively the Nicaragua route and the Panama route. The other routes were found to combine various disadvantages, such as an excessive height for the summit-level (and the consequent necessity for tunneling); the lack of adequate harborage at the terminals; great length; an insufficient water-supply for the lockage. Perhaps none of the routes that have been described presents insuperable obstacles for modern engineering skill and science. In view of actual achievement, we are slow to say nowadays that things cannot be done. The notion of a canal with a tunnel, particularly at San Blas, where the distance is so short, has been soberly entertained by many persons as a feasible, and more than that, a reasonable project. But one will not find the best engineering opinion to be in favor of any scheme of canalization which involves a tunnel.

"The San Blas route is the best that has ever been discovered on the Isthmus," Mr. Morison told a subcommittee of the Senate,⁴ "until you get in two miles from the sea at each end. . . . So far as length of time and convenience of approach and harbors are concerned it is the best line there is: but it involves a tunnel which I consider absolutely fatal to it. . . . And even if that tunnel were perfectly practicable, I consider that the objection to taking ships through a tunnel 4 or 5 miles long would exceed all possible benefits and advantages which that line might have. . . . In the first place, the tunnel ties you up in your dimensions. You cannot enlarge the tunnel. When it is done you never can increase the size of your ships. It is the unit. Two ships cannot meet in the tunnel. You have to send one ship through at a time. Perhaps you can follow it by another going in the same direction, but no ship can come

⁴"Statement of Geo. S. Morison before the Subcommittee of the Committee on Inter-oceanic Canals, United States Senate." Washington: Government Printing Office, 1902, p. 20.



FIRST SIDE WALL MONOLITH COMPLETED. UPPER LOCK, GATUN. FEB. 1, 1910.

through from the other direction until the tunnel is cleared. Then you have the question of ventilating that tunnel. You have your bad air coming out of your smoke-stacks and all that kind of thing while you are going through. You have a large water resistance in there. If anything happens to a ship in the tunnel it is going to be a very awkward thing to get it out. If anything should happen which would cause the ship to sink or ground in the tunnel it would be a very difficult thing to get her out at all."

General Edward W. Serrell before the same committee described the projected tunnel of a San Blas route in which he was interested. This route is from Maudinga harbor, on the Bay of San Blas, to the little Bayano River on the Pacific side. The tunnel would be somewhat less than five miles long, and General Serrell supposed it would be through granite. "You will find in the reports of Rude and McDougal, and, I am pretty sure, of Sweet—yes, in Sweet's report—that they speak of sharp cliffs of granite, and in the field books reference is made to 'granite,' 'granite,' 'granite' several times—I think 24 or 25 times on the 30 miles."⁵ Mr. Morison, questioned as to the "geological character of the ridge to be tunneled," says: "The presumption is that it is volcanic rock. . . . That is, it is largely basalt; but at the same time other rocks may be found there. . . . There was nothing I saw which indicated to me that there was granite there, and I do not think I saw any granite on the Isthmus, either at Nicaragua or Panama, or around there."⁶ Again he says: "There is no reason to suppose that there is a particle of granite anywhere on this route. The statements that the mountain is of granite are derived from old note books, about fifty years old, in which pencil notes designate the surface rock as granite. The engineers employed by the Commission, who traveled over all the country and traced the summit, were unable to find any granite, and I know no one who has ever seen any granite anywhere on the Isthmus." On page 153 of Selfridge's report (1874),⁷ three varieties of granite are mentioned—epidotic, syenitic, and common micaceous. And again,⁸ "about a quarter of a mile up the brook from where the

⁵ General Serrell's statement, p. 6.

⁶ Mr. Morison's statement, p. 5.

⁷ "Reports of Explorations and Surveys," etc., by Thos. Oliver Selfridge, Washington, 1874, previously cited.

⁸ Selfridge, p. 154.

trail crosses at camp No. 4 is a section of the granite-bed, showing where either the granite was only partially formed or where the decomposing action has in time changed the material from granite to merely disintegrated quartz and feldspar. . . . This milky white bank was so soft and inviting that a species of woodpecker had taken possession of it for building purposes." It is true that it is difficult to find references to granite in the more recent literature. Most of the backbone of the Isthmus is, naturally, rock of a volcanic character.

Enough has been said to show that the conclusion of the Commission was just—the disadvantages of a tunnel outweigh all desirable features a tunnel-route may possess.

GEOGRAPHIC NEWS AND NOTES

An invaluable compendium of information relating to Mexico, Central America, the West Indies and South America is provided in the successive issues of the *Bulletin* of the Pan American Union at Washington, of which John Barrett is director general and Francisco J. Yánes is assistant director. Each issue contains handsomely illustrated articles on the several countries represented in the Union, and there are exhaustive summaries of the magazine literature of the month dealing with Latin America, as well as succinct reviews of the progress of our sister republics and a statement of the subject-matter of consular reports. Last summer the *Bulletin* published in two sections an "Annual Review Number" which in itself constitutes an admirably indexed volume of about 500 pages, with abundant illustrations, containing more up-to-date information about Latin America than is to be found in any other work of which we know. To mention only a few of the valuable features of recent number of the *Bulletin*: in the September issue appears a monograph on the ruins of Mitla in the Mexican State of Oaxaca, in the October number appear accounts of the Isle of Pines, and the River Heath, a description of the lives of the South American Indians, and of cotton cultivation in Argentina; the magazine for November devotes considerable space to Major Kerbey's informed and informing article on Amazonia, while Albert Hale, of the Pan American Union staff, writes attractively of "The Potato: America's Edible Tuber." Eight pages, with illustrations, are given to the late Edward Whymper's splendid work in the Ecuadorean Andes, and there is an account of the completion of another section of the remarkable Madeira and Mamore Railway. Any brief review does scant justice to the diversity and value of the contents of the *Bulletin*; the Union of which it is the organ is doing a great work in its fruitful encouragement of the sense of community of interest among the republics of the Western Hemisphere.

A timely contribution to the expanding literature of the African Mediterranean region is that of Frank Edward Johnson's article, "The Mole Men: an Account of the Troglodytes of Southern Tunisia" which appears as the leading article in the *National Geographical Magazine* for September. He describes the services of French officers in Northern Africa. "These men of war turn to agriculture and teach the Arabs how to improve their olive trees; how to graft new life into old trees; how to breed better cattle and horses; to raise more barley on their dry soil; make plans for piping water and digging wells; turn doctor and heal their diseased and suffering families. In short, bring order and system out of chaos, establish schools, law and order,

and make peace reign where 30 years ago was rapine, fire, and sword." "A Visit to the Brazilian Coffee Country" by Robert De C. Ward, of Harvard University, is the subject of a clear and careful account of the history of the coffee bean from the bush to the breakfast table. "Glimpses of Japan," copiously illustrated in colors, is the foremost contribution to the November magazine, in which is published also Adolf L. Vischer's description of "Tripoli: a Land of Little Promise."

The American Geographical Society of New York will conduct an excursion of some six weeks' duration across the United States in the autumn of 1912. "The excursion will be directed by Professor W. M. Davis, of Harvard University, who hopes to have the coöperation of a number of American geographers. It will be made in a special train, including sleeping cars, a dining car and an observation car. The date of beginning will be placed as late in August as possible, in order to avoid the heat of the American summer; the date of the end must be little later than the middle of October, in order to enable European members to return home in time for university duties before the end of that month. The precise dates of beginning and ending will be determined by later correspondence and by conference with intending participants who may be present at the International Geographical Congress at Rome in October, 1911.

"The number of members will necessarily be limited to fifty or sixty persons (men only), of whom it is expected that thirty or more may be European geographers. Invitations to appoint delegates whom the Society may receive as members of the excursion have lately been sent to fifteen geographical societies of Europe, in Amsterdam, Berlin, Bern, Brussels, Budapest, Christiania, Copenhagen, Lisbon, London, Madrid, Paris, Rome, St. Petersburg, Stockholm, and Vienna. After information is received as to the European membership, it is intended that invitations to take part in the excursion shall be sent to a number of American geographers.

"The route of the excursion as now planned includes the following points: New York, Chicago, St. Paul-Minneapolis, Butte, Seattle (possibly San Francisco), Salt Lake City, Denver, Grand Canyon of the Colorado in northern Arizona, St. Louis, Memphis, Chattanooga, Washington, New York."

Of interest to aeronauts is the international air map which M. Lallemand, inspector general of mines and president of the French Association, described at the Portsmouth meeting of the British Association for the Advancement of Science in September last. His paper is printed in the November *Geographical Journal*. The proposed map is on a scale of 1 to 200,000, with the meter as the unit of lengths and the Greenwich meridian as the origin of longitudes. The map is designed to show all striking objects that are readily visible to the aeronaut, including even factory chimneys and church steeples.

That much of "this goodly frame, the earth" is still terra incognita is

demonstrated in Frank R. Cana's contribution in the same issue. The title is "Problems in Exploration: Africa." He says that "more than 1,000,000 square miles of the continent—an eleventh of its whole area—still remains unexplored. Some three fourths of this unknown country lies within the limits of the Sahara. . . ." In the region known as The Juf is a tract "more than half the size of France, upon which the eye of European has never gazed. Between Adrar of the Iforas and the Oasis of Air is "a district as large as Scotland, of which very little is known." "Half of Morocco remains to be mapped, as well as the coast region south of Cape Juby."

In 1914, upon completion of the canal which is to shorten and straighten the Guadalquivir River from Seville to the Atlantic Ocean, says *Consular Reports*, it is proposed to hold in Seville a Spanish-American Exposition to celebrate the opening of this new era in the history of Seville as a seaport. This port, now available for ocean-going vessels with draft of 25 feet, is expected by this Alfonso XIII Canal to secure a larger ocean trade. Situated on a tidal river, Seville combines the advantages of an industrial and distributing center and a seaport for trans-Atlantic commerce.

In the sixteenth century Seville was the principal European trading port with the New World. To inaugurate a second epoch of great commercial and maritime activity the Spanish-American Exposition has been planned, and all the Spanish-American republics of the Americas will be invited to participate.

The Ouse and the Trent Rivers, tributaries of the Humber, are to be diverted, Consul Walter Hamm reports from Hull, "in such a way that the combined discharges will follow the channel taken by the early flood and serve to keep the channel clear. At present the two rivers enter the Humber in almost direct opposition, so that instead of increasing the strength of the current at their junction they exhaust their energies in altering each other's direction, thus actually decreasing the strength of their united streams. This reduction in the speed of the ebb lessens the scour and makes the channel at this spot worse than in any other part.

"At a recent meeting of the Humber Conservance Board it was suggested that the construction of half-tide training walls—one 5 miles long in the upper Humber, a second 5.71 miles in length in the Trent, and a third 2.35 miles long in the Ouse—with the removal of a rocky ledge would accomplish the desired result, at an estimated cost of \$1,140,000."

In 1907, when the last census of Cuba was taken, there were 6,713 Americans in the island republic. There are now, Consul General Rodgers estimates, less than 5,000. In 1907 there were 2,422 Americans in Havana.

The damage to property and crops caused by Mount Etna's eruption on September 10, 1911, is estimated at \$2,316,000 to \$2,895,000. No lives were lost.

"The mosquito is more numerous in the Arctic Zone than in the Tropics, though there is no land too cold or too hot for its habitation, and the only place where it is not found is in localities where there is little or no moisture," says Consul Cole, of Dawson. There is no country where the mosquitoes are so large and so numerous as they are in the Klondike, and it is impossible to destroy them, as they propagate in the heavy moss that grows here, which contains moisture almost equal to swamp lands. If, therefore, a safe preparation were invented which would keep the mosquito away there would be an immense sale for it, not only in Alaska and the Canadian Klondike, but in all parts of the world."

The Yukon member of the new Canadian Parliament has brought forward a proposal for a railway from a point on the Lynn Canal, Alaska, south of Skagway, through to Dawson. A prosperous future is predicted for the region which will be opened up by the new trade-route.

"Mr. Hiram Bingham, of Yale University, who in 1909 had explored the extensive but little known ruins of Choquequero on the Apurimac, has now sent home a brief account of the work he has achieved in Vilcapampa [in Peru]," writes Sir Clements R. Markham, in the *Geographical Journal* for December. "... I trust that it is the forerunner of a fuller topographical description of Vilcapampa and of its ruins. There seems to be evidence that a more well-established court and government, with stone edifices of good Inca architecture, existed there during the thirty-five years' Inca rule (1536 to 1571) than has hitherto been supposed. ... It is one of the almost innumerable tracts of country over the earth's surface which are practically unknown to geographers."

In the December *Contemporary Review*, Dr. J. W. Gregory discusses "The Resources of Tripoli" and concludes that "The general evidence indicates that Tripoli is of little direct use as a colonial possession." The province of Tripoli is an arid waste with little correspondence to the fertile regions of Morocco and Tunis. In the most fertile province, Cyrenaica, rainfall is much less than in the countries to the west, the water supply is insufficient, the area of land capable of cultivation small, and owing to the nature of the ground "the processes of dry-farming are inapplicable." Mineral resources are meager. "Ores have been found in some of the older rocks of western Tripoli, but there is no special reason to regard them as of commercial value. Cyrenaica has some bitumens, but, so far as known, in not sufficient quantity to be of more than insignificant local use."

During the year 1909-10 the petroleum yield in Burma reached a total of 230,000,000 gallons, an increase from 173,000,000 gallons in the preceding year. The excessive exploitation now going on, it is feared, will cause rapid exhaustion.

The attention of the American people to the great work of constructing the Panama Canal has prevented much notice of a work of almost equal magnitude that is taking place in New York State in the construction of the Barge Canal. Both of these canals are of great geographic importance. The cost of the Barge Canal is nearly one-third that of Panama, although the expense is borne by one state, it is nine times longer, it requires an excavation of 132,927,300 cu. yds. of earth as compared with 174,666,594 at Panama, it requires 54 locks, 300 feet long, as compared to 12 locks 1,000 feet long at Panama, and the elevation to which boats must be lifted on the Barge Canal is much greater than at Panama, which requires but 85 feet elevation.

The losses sustained by Professors Tarr and Martin in the upset of their wagon in crossing a glacial stream in Alaska were not as great as first reported in the newspapers and in the October number of the *BULLETIN*. No photographic negatives were lost, but one of Professor Tarr's note-books with records of the first month's work was carried away. After a long journey 1,200 miles up the Yukon and by land across central Alaska, they were returning from their summer's work, under the auspices of the National Geographic Society, in investigating glacial phenomena in Alaska.

The largest mountain park in the world, says the *Canadian Magazine*, is the forest reserve recently set apart by the Canadian Government in the Rocky Mountains, forming a tract about three hundred and fifty miles in length and from ten to fifty miles in width.

Texas cotton is finding a market in Japan, which has hitherto obtained its cotton supplies largely from India. Texas has an advantage in this trade over the States farther east, on account of its being much nearer to the Pacific ports. *Shipping Illustrated* predicts that 100,000 bales will be sent this season to Japan.

Wild beasts and venomous serpents together, it is said, cause a loss of nearly five hundred human lives every week in India. Snakes alone caused the death of twenty-two thousand persons there in 1910, notwithstanding the efforts of the authorities to exterminate these foes of humankind.

"Maps and Map-making" is the subject of an article in the January *Harper's* by Cyrus C. Adams. "The use of color on maps," says Mr. Adams,

"has now been reduced by the best map-makers to a logical system. Not very long ago we saw on our own maps of the United States each State differentiated from those around it by a covering of color. A tint along the boundaries would have answered every purpose and left opportunity to use colors throughout the sheet as part of the scheme of symbols. Many map colors are now copied directly from nature, and often those selected are particularly appropriate, as, for example, the common use of blues for rainfall maps, the deepening blues of the sea as depths increase, the deepening buffs and browns as the heights of the land augment, the yellow tints for arid and sandy regions, and greens largely used on maps dealing with plant geography. The map-makers of the leading nations are approaching one another more and more nearly in their use of map colors; and for public convenience it is hoped that some day we shall see a uniform system of colors in all map symbolism. Such questions as these are sometimes settled by scientific bodies, as was the case when the Geological Congress at Bologna, in 1881, selected the colors to be applied to the International Geological Map of Europe."

The perennial question "What is Geography?" was the topic of discussion in the Presidential Address on the "Purpose and Position of Geography" before the Section on Geography at the Portsmouth meeting of the British Association last summer, given by Colonel C. F. Close, and printed in the October number of *The Scottish Geographical Magazine*.

To determine the content of geography, Col. Close analyzed the contributions to the Royal Geographical Society during the past five years and found that out of 296 original papers, 57 per cent. deal with explorations and travels, 10 per cent. with general physical geography, 7 per cent. with economic and social geography, and the remainder with small percents each in vulcanology, hydrography, glaciers, oceanography, meteorology, etc. He concludes, therefore, that geography is still a matter of explorations and surveys, that a geographer is an explorer, or a man who compiles books derived from the labors of surveyors, geodesists, geologists, etc., and that a geographer's work is mainly popularizing other sciences, but that he cannot hope to do original work himself. "We ourselves," he says, "have our own special work which is shared by no others, the great task of mapping the world."

While in no way agreeing with these conclusions, we give below one other quotation from the address, which will be of interest as showing the views of the writer:

"If we study the relations between geography and other subjects we are almost bound to arrive at the conclusion that geography is not a unit of science in the same sense in which geology, astronomy, or chemistry are units. If we inquire into the current teaching of geography, and examine modern textbooks, we find that most of the matter is derived directly from the workers in other fields of study. And if we inquire into the products of

geographical societies, it became evident that one of the most important functions fulfilled by these useful bodies is to popularize the work of geodesists, geologists, climatologists, and others, and to provide a common meeting-ground for them. If geography had been able to include geology and the other sciences which deal with earth-knowledge, it would then, indeed, have been a master science. But things have worked out differently."

Professor William Morris Davis, of Harvard, is exchange professor at the University of the Sorbonne at Paris this year. Two years ago Professor Davis gave a course of lectures in geography at the University of Berlin. These two appointments in rapid succession form a high tribute to this distinguished American geographer and reflect much credit upon the science of geography in our country.

The newspapers announce the completion of plans for the construction of a great power house west of Mauch Chunk, Pennsylvania, utilizing the great culm deposits of that region for fuel. Towns within a radius of 40 miles are to be supplied for manufacturing purposes and for mining, and the company plans ultimately to send power to Philadelphia. The cement and slate regions will receive power from this plant, the silk manufacturing towns, and in fact all the anthracite region.

According to the recently issued report of the Secretary of Agriculture, the total value of farm crops in 1911 has declined from that of the preceding year, a fact due to the unusual drought which prevailed over the country during May and June. There is, however, a great abundance of farm crops for all purposes.

With a value more than twice that of the cotton crop this year, and but little less than the combined values of the cotton, wheat and oat crops, corn is by far the leading crop as a wealth producer. The estimate of 2,776,000,000 bushels indicates a production that has been exceeded in only two years. The value of the cotton crop is placed at \$775,000,000. Poultry products nearly reaches the total value of cotton.

Six hundred thousand tons of beet sugar were made in the United States last year in 67 factories. There is an estimated world's shortage of 1,600,000 tons of sugar.

BOOK NOTES AND REVIEWS

Newbiggin, Marion I. *Modern Geography*. Pp. 250. New York, Henry Holt & Co.; London, Williams and Norgate. 1911.

This little book is to be highly commended as a simple, accurate and interesting, though brief, statement of the scope and meaning of modern scientific geography. If it is designed, as it evidently is, to acquaint those readers who may wish to know the trend of present-day geography with the place that the science now fills, its method of treatment, clear style and concreteness of illustration ought to insure its success in the accomplishment of its purpose. "The geography of to-day," the author tells us, "is in the act of escaping from the matrix of mere facts in which it has been too long imprisoned. It is now displaying itself as a great unit in the making of which all the sciences have played their part." And it is this unity in the subject that the author attempts to indicate.

After an introductory chapter on the "Beginnings of Modern Geography," the physical side of the subject is treated in three chapters—"Surface Relief and the Process of Erosion," "Ice and Its Work," and "Climate and Weather." Each of these chapters gives an untechnical, yet accurate and illuminating, summary of the topic it discusses. Where controversy exists as to explanations of surface phenomena, the author sets forth both sides impartially, as, for example, in the treatment of the origin of hanging valleys, and other glacial forms both the "erosionists" and the "protectionists" have their sides clearly stated.

The last five chapters of the book treat of the organic side of geography. The topics discussed are Plant Geography, Distribution of Animal Life, The Races of Europe and their Origin, The Distribution of Minerals and the Locations of Industries and Towns. A brief list of books, valuable for the interested reader who wishes to investigate more fully the topics discussed, is found at the end.

We strongly recommend the reading of this book especially to all who are interested, but who have had no special training, in modern geography.

Sample, Ellen Churchill. *Influences of Geographic Environment*. Pp. xvi, 683, maps. New York, Henry Holt & Co., 1911. \$4.00.

No book published in recent years has made so large a contribution to scientific geography as this latest book by Miss Sample. Based upon Ratzel's "Anthropo-Geographie," it does very much more than make available in English the conclusions of that great and pioneer work. Miss Sample has written a new book. She has rearranged and classified, tested and verified,

the facts of Ratzel and at the same time added very much valuable and original material, built according to her own plan and working out her own ideas. The book is at once a classified survey of the great field of geographic influence on human activities and a mine of information of great value to the student especially of political and social sciences and of absorbing interest to the intelligent general reader.

No adequate account of so comprehensive a work can be given in a few words. The titles of some of the chapters will indicate its extent and scope. The introductory chapters deal with "The Operation of Geographic Factors in History" and "Classes of Geographic Environment." These are followed by chapters on "Society and State in Relation to the Land," "Movements of Peoples in their Geographical Significance," "Geographical Location," "Man's Relation to the Water," "Island Peoples," "Influences of a Mountain Environment," "Influences of Climate," and similar topics.

The following quotation from the first chapter may serve well to give an idea of the style and subject matter treated. "Man is a product of the earth's surface. . . . She has entered into his bone and tissue, into his mind and soul. On the mountains she has given him leg muscles of iron to climb the slope; along the coast she has left these weak and flabby, but given him instead vigorous development of chest and arm to handle his paddle or oar. In the river valley she attaches him to the fertile soil, circumscribes his ideas and ambitions by a dull round of calm, exacting duties, narrows his outlook to the cramped horizon of his farm. Up on the wind-swept plateaus, in the boundless stretch of the grasslands and the waterless tracts of the desert, where he roams with his flocks from pasture to pasture and oasis to oasis, where life knows much hardship but escapes the grind of drudgery, where the watching of grazing herds gives him leisure for contemplation, and the wide-ranging life a big horizon, his ideas take on a certain gigantic simplicity; religion becomes monotheism, God becomes one, unrivalled like the sand of the desert and the grass of the steppe, stretching on and on without break or change. Chewing over and over the cud of his simple belief as the one food of his unfed mind, his faith becomes fanaticism; his big spacial ideas, born of that ceaseless regular wandering, outgrow the land that bred them, and bear their legitimate fruit in wide, imperial conquests."

ACTIVITIES OF THE SOCIETY

The work of the society for the year had its formal beginning on Wednesday evening, November first, when, after a brief address on Current Geographic Events by President E. R. Johnson, Mrs. Harriet Chalmers Adams gave a beautifully illustrated lecture on "From the Amazon to the Orinoco."

CURRENT GEOGRAPHIC EVENTS.

REMARKS BY THE PRESIDENT OF THE SOCIETY.

President Johnson said in part:

As our Society begins the series of meetings to be held this winter, geographical events of first importance are transpiring in several parts of the world.

Tripoli is apparently soon to be freed from the restraint of Turkey and to be guided forward by a modern nation. When Italy secures Tripoli all northern Africa will be under the influence of European civilization; and a part of the earth once potent in the affairs of the world, but long shackled, will again be free to advance.

At Suez, the canal company is spending 100,000,000 francs in deepening and widening the world's great highway to and from the East. It is interesting to note that the use of this waterway, which is a good index of the progress of the world's commerce has increased from less than ten million to more than sixteen million tons of shipping during the past decade.

In China, epoch-making changes are now being made. After centuries of political oppression, China, supposedly inert, seems energized. Whether a real political and economic revolution will result from the present turmoil is doubtful; but it is certain that the old order is passing.

A quest of the South Pole is being made by several rival expeditions. America, led by the dauntless Peary, won the race for the North Pole. We are now watching the race between European nations for the Southern goal. On the American Continent the events in Mexico have held first place during the past year.

In South America an expedition under the leadership of Professor Bowman, of Yale University, is making explorations in the high Andes. Professor Bowman is expected to return early in 1912, and I hope it may be possible for him to give us an account of his work.

The geographic fact of greatest significance to the world is the approaching completion of the Panama Canal. The opening of this waterway will change the geographical relationships of a large part of the world. The

waterway that Columbus sought in vain to find, that Humboldt stated to be possible, that De Lesseps failed to establish, the United States is about to open for the use of all nations upon equal terms.

The Canal will be ready for the passage of merchant vessels within two years. The work at the great dam and in Culebra Cut is three-fourths completed. What remains to be done involves no serious difficulties. The problems of canal construction have been revealed and solved—disease has been held in check, the Gatun Dam has been established upon a broad and sure foundation, the massive locks will be completed during 1912, and their operating machinery will be installed before the close of 1913. Even the sliding banks of the Culebra Cut, which during 1909 and 1910 caused no little anxiety, are approaching the angle of repose.

The time has come to decide what shall be done with the Canal, what tolls shall be charged for its use, and how it shall be operated, and it is to be hoped that the United States may manage the Canal with as much ability as has been shown in its construction.

FROM THE AMAZON TO THE ORINOCO.

Mrs. Adams told of her trip through what she called "the five Guianas"—British, Dutch, French, Brazilian and Venezuelan. Starting up the Amazon from Para on small native boats, Mrs. Adams spent several weeks living in small native huts of the inhabitants of the Brazilian jungle, a stay that was prolonged by severe illness due to eating fowl that had been killed with a poisoned arrow. Going next to Cayenne in French Guiana, she visited the other capitals—Paramaribo and Georgetown, and lastly ascended the Orinoco from Trinidad. Mrs. Adams has now completely encircled the continent and plans next to cross it overland from north to south.

THE PRESENT SITUATION IN MEXICO.

BY

PROFESSOR LEO S. ROWE.

Professor Leo S. Rowe, of the University of Pennsylvania, delivered an address before the Society on Wednesday evening, December 6, discussing with the authority of intimate, first-hand knowledge the present situation in Mexico, and the consequences of the revolution. Dr. Rowe said in part:

"In all the discussions of the subject it is taken for granted that the immediate future of the country depends on the statesmanship and executive ability of President Madero. In reality the crisis through which the country is now passing constitutes a supreme test of the Mexican people. The real question is whether the political education of the people has advanced sufficiently to permit the operation of the Constitution of 1857 in the spirit in

which it was framed. Has the nation developed sufficient self-control to permit a policy which does not involve the stern repression of every indication of independent political action?

"The country is confronted by a series of educational and social problems so stupendous as to be almost appalling. The new government has shown a determination to grapple with these problems, but it is evident that no progress can be made if such disturbances as have taken place during the last three months continue or, as is threatened, become more general. Whether a policy of conciliation and compromise can maintain order throughout the republic remains to be seen. If this policy fails, Mexico faces a recurrence of the anarchical conditions which prevailed during the 50 years prior to the assumption of power by General Diaz.

"In the distance there looms up that specter which is constantly haunting the Mexican people, namely, the possibility of American intervention. No matter how strong the assurances of our government that such intention is remote from the thought of the American people, it is impossible to dispel the belief that sooner or later the American government will undertake to restore order in Mexico. Every movement of our troops, no matter how innocent, is interpreted as a step in this direction. Even when such movements are made for the purpose of preventing American territory from becoming the hatching-ground for conspiracies against the Mexican authorities, the purpose of our government is misunderstood and misinterpreted by the mass of the Mexican people.

"It is true that this feeling has exerted a steadying influence on the domestic political situation, but it also means that fear and distrust of the United States are growing. However much we desire to help the Mexican people in their present hour of need, we must face the fact that every such attempt will be misinterpreted.

"The position of the American continent in the present crisis is exceedingly difficult and delicate, and it will require all the tact and diplomacy of the State Department to impress upon the people of Mexico that the United States does not desire one inch of Mexican territory and has not the slightest intention of interfering in the internal affairs of the republic."

CONSERVATION OF PENNSYLVANIA COAL SUPPLIES.

EDWARD W. PARKER,

UNITED STATES GEOLOGICAL SURVEY.

The coal fields of Pennsylvania are embraced in areas aggregating approximately 14,680 square miles. They are divided into two main regions, the anthracite and the bituminous. The anthracite region, from which to the close of 1910 nearly 50 per cent. of the total coal output of Pennsylvania had been produced, is restricted to an area of 480 square miles lying in the eastern central part of the State, and contained within the counties of Carbon, Columbia, Dauphin, Lackawanna, Luzerne, Northumberland, Schuylkill, Sullivan, Susquehanna and Wayne. The bituminous region comprises about 14,200 square miles, the great part of the western half of the State. Bituminous coal is mined in thirty counties, of which the more important, named in order of output, are: Fayette, Westmoreland, Allegheny, Washington, Cambria, Indiana, Somerset, Clearfield, and Jefferson. When man began his attack upon the bituminous area they contained a total supply now estimated at 112,574,000,000 short tons. From this original supply there had been mined, to the close of 1910, a total of approximately 2,252,000,000 short tons, and as it is estimated that for every ton of coal mined one half a ton has been lost, the actual drain on this part of nature's storehouse has amounted to nearly 3,400,000,000 tons, or about 3 per cent. of the original supply.

The most interesting and startling fact to be stated in this connection is that more than 50 per cent. of the total output, or over 1,185,000,000 tons, has been produced in the first decade of the present century. In other words, the production in the last ten years has exceeded that of the preceding sixty years, dating from 1840 when bituminous coal mining became established as an industry.

The beginning of anthracite mining antedated that of bituminous mining in Pennsylvania more than a quarter of a century. The industry is generally considered as having started in 1820, when 365

long tons,¹ one for every day of the year, were shipped, though some unsuccessful efforts to mine and sell the product had been made in the last decade of the eighteenth century. The production of anthracite in recent years has not made such great strides as has that of bituminous coal, but it has kept pace with the increase in population, and until 1909 the total output had exceeded that of bituminous coal in Pennsylvania. To the close of 1910 the production had aggregated 1,946,727,384 long tons (equivalent to 2,180,334,670 short tons). But while the total production of anthracite has been nearly equal to that of the bituminous output of the State, the drain on the reserves has been relatively greater. As has been stated, the anthracite area is comparatively small. The quantity of anthracite originally available when mining began has been estimated by the Pennsylvania Geological Survey at 19,500,000,000 long tons, less than 20 per cent. of the original bituminous supply. Moreover, in the early days of the anthracite industry the losses in mining and preparing the product were large as compared with those suffered under modern practice. In 1893, when the Pennsylvania Coal Waste Commission made its report, the recovery—the quantity of coal actually utilized—was only 40 per cent.; that is to say, for every ton of coal marketed one and a half tons were lost—one ton of coal utilized meant a draft of two and one half tons on the supply.

Years before the recent dramatically staged conservation movement was presented to the public the small area of the anthracite fields, the relatively large loss in mining, and the necessity for reforms that would lessen the waste and conserve the supply of anthracite for the use of future generations, impressed themselves upon the engineers and other men of thought and action in the anthracite region. Monuments have been erected to less worthy men than Eckley B. Coxe, Rossiter W. Raymond, P. W. Sheaffer, Heber S. Thompson, Franklin B. Gowen, William Griffith, and others, who were the pioneers in the cause of conservation and who accomplished practical results. The act of the Pennsylvania legislature creating the commission "to investigate the waste occasioned by the mining and preparing of coal in this Commonwealth (Pennsylvania)," which was approved May

¹ In the mining and marketing of anthracite the long ton of 2,240 pounds is the established unit. In bituminous production the short ton of 2,000 pounds is the customary unit, exception being made, however, in shipments to Atlantic coast points, when the long ton is used.



Photo by G. B. Roorbach.

FIG. 3.—Modern type of breaker.



FIG. 4.—Fireproof breaker of steel and concrete, at Mineral Springs. The latest type of anthracite breaker.



FIG. 1.—Old-time breaker in anthracite region.



FIG. 2.—Intermediate type anthracite breaker.

7, 1889, was due largely to the efforts of Mr. Coxe, who was made one of the members of that commission. The commission began its work in 1890, more than twenty years ago, and submitted its report in 1893. Did it accomplish any useful purpose? The answer to this question is given in the statement already made that the estimated waste in 1890 was 60 per cent.; to-day it is probably less than 40 per cent. Formerly one and a half tons were lost for each ton marketed; now one and a half tons are marketed for each ton lost. Mr. Coxe himself invented a grate designed for using small sizes of coal formerly wasted, and to this invention is due the gradual disappearance from the landscape of the unsightly culm banks in the anthracite region.

Much of the waste in the earlier days was caused by the kind of reckless competition that is still exercising a baleful influence in the bituminous coal production districts. The cut-throat system of competition in the anthracite region has been remedied by securing close control of the trade—practical monopoly which was made possible by the comparatively small area of the field. It is not claimed that this monopoly has reduced the cost to the consumer—it has had the contrary effect—but it has resulted in a high degree of prosperity to the mining communities, in marked improvement in mining methods, and in better returns on the capital invested in the industry. Of as much importance as all of these is the prolongation of the life of the fields. It is not too much to believe that with the constantly increasing efficiency and consequently greater percentage of recovery now made possible, that the life of the anthracite fields, which less than a decade ago was placed at 100 years, has been prolonged 100 per cent. Probably in no other industry in this country has practical conservation been so successfully achieved. The monopoly of the anthracite industry has not been an unmixed evil. It certainly was necessary and it might indeed be termed beneficent, for it has been a means of conserving one of our important and exhaustible natural resources.

The development of the anthracite industry is illustrated by the accompanying views. Fig. 1 shows one of the early types of breaker, Fig. 2 one of an intermediate type, and Fig. 3 one of modern design and size. Fig. 4 shows one of the latest types of anthracite fireproof steel and concrete breaker at the Mineral Spring operations of the Lehigh Valley Coal Co.

One of the most interesting phases of anthracite mining is what is known as "stripping." In a number of places, notably near Hazleton and at Summithill, the coal beds come to the surface and the light overburden is stripped off, exposing the coal which is then mined by open-cut or quarrying methods. Fig. 5 shows the operations at Summithill. The size of the operations may be judged from the figures of the men. Figs. 6 and 7 exhibit the operations at Hazleton, where the steam shovel forms a part of the equipment.

Between the conditions under which anthracite is mined in Pennsylvania and those under which bituminous coal is mined, not only in Pennsylvania, but elsewhere in the United States, there is a great gulf fixed. The total bituminous coal areas in the United States aggregate about 250,000 square miles, of which those of Pennsylvania represent less than 6 per cent. The bituminous supplies of Pennsylvania are about 3.5 per cent. of the total for the United States. The total production of bituminous coal in 1910 was 417,111,142 short tons, of which Pennsylvania produced 150,521,526 tons. The total production for the United States from the time of earliest record (1820) to the close of 1910 has amounted to 6,063,016,600 tons, of which Pennsylvania has contributed 2,251,737,097 tons, showing that while this Commonwealth possessed, when mining began, but 3.5 per cent. of the total supplies, it has produced more than one third the total output and is producing it in about the same proportion at the present time. How long can this continue?

If we assume that for some decades yet to come the average recovery will remain as at present—about 65 to 70 per cent.—and that the production will remain practically constant at the present rate, the bituminous supplies of Pennsylvania would last approximately 500 years. But the output in the first decade of the present century was more than double that of the last ten years of the nineteenth century, and that in turn was nearly double that of the preceding decade and more than four times that of the ten years from 1871 to 1880. A very short and simple calculation will show that if this increasing rate of production is to continue it is high time to take heed of the morrow. It is easy to say that something should be done, but to state what that something may be is not so easy. The bituminous coal fields are scattered over thirty different states and territories. The productive capacity of the mines now in operation is probably from 50 to 75 per cent. in excess of the four hundred

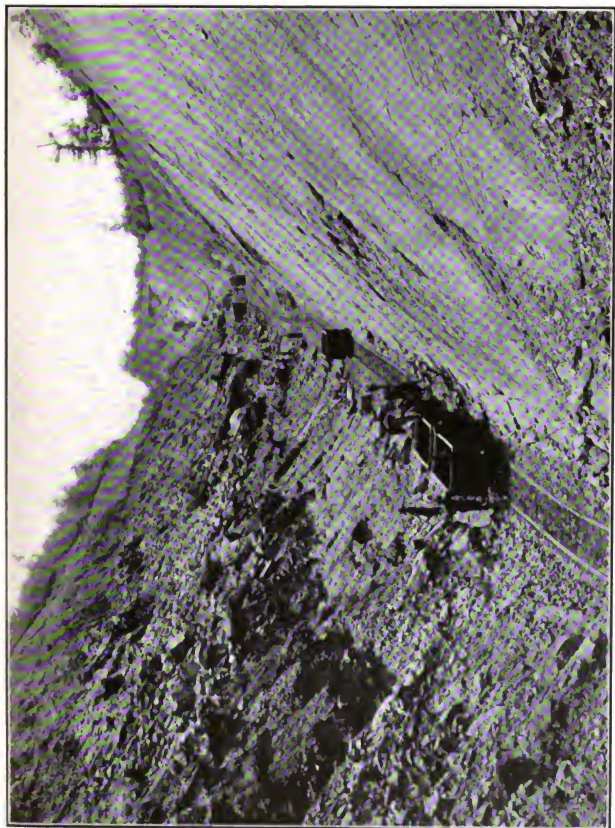


FIG. 5.—Coal stripping, Summit Hill. Coal beds at steep angle. Note stripped surface of rock at right side. Lehigh Coal & Navigation Co.

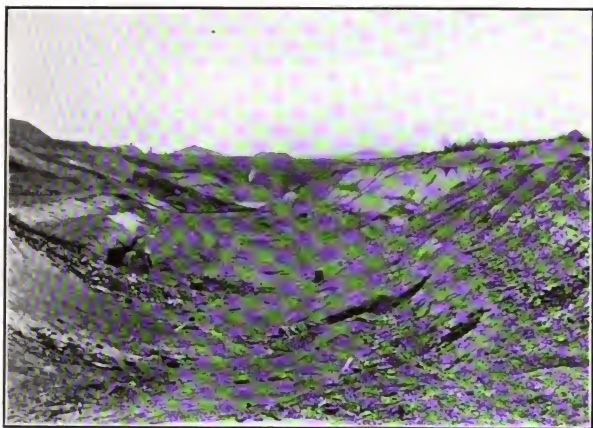


FIG. 6.—Stripping near Hazleton. A synclinal trough. The railway tunnel in left central part of picture is through a bed of anthracite. Steam shovel in left foreground. Photo by G. B. Roorbach.

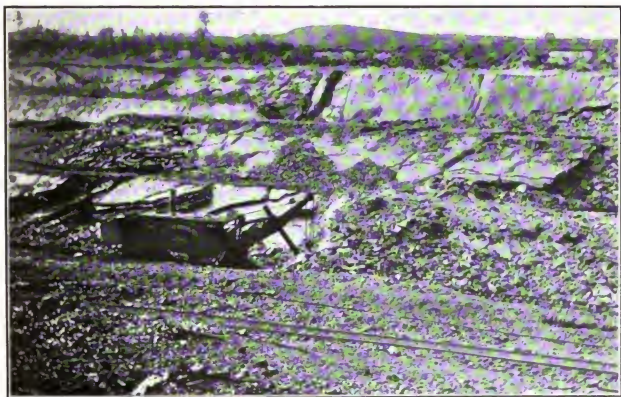


FIG. 7.—Steam shovel in coal stripping, near Hazleton.

odd million tons produced in 1910, and if the demand required it and the labor and transportation facilities were adequate, the tonnage of 1910 might be doubled without opening another property.

There is a constant nerve-racking, price-cutting struggle for orders; mine competes with mine, district with district, state with state. The bituminous coals of Pennsylvania must compete in the markets of the Atlantic seaboard with the high-grade and cheaply-mined coals from Maryland, Virginia, and West Virginia. In the "Lakes" region they must meet in competition coals from Ohio, Illinois, Kentucky, and West Virginia. The several producing districts of the state compete with one another for the trade of central and western New York, and for the markets across the international boundary. So keen has been this competition that the margins between cost and selling price have not been sufficient to permit the practice of mining methods that will insure the maximum recovery, the minimum waste, and the adequate safeguarding of lives and property. Recovery of more than a certain percentage of coal increases the mining cost, and when in order to accomplish this real conservation the cost approaches too closely the danger line of actual loss, the cause of conservation suffers.

An opinion generally expressed by those interested in bituminous coal mining is that, if the supplies are to be conserved and life and property protected from accident, legislation must be enacted that will enable the producers to effect a control of that branch of coal mining under federal supervision, if need be, as the operators in the anthracite region have gained for themselves without the aid of legislation or governmental supervision.

On February 1 of this year a committee representing the bituminous coal-mining interests of several states appeared before the Committee on Mines and Mining of the House of Representatives at Washington, urging the enactment of legislation that would permit a more conservative control of the industry.

There is one part of the bituminous coal industry in which reform and more intelligent conservation may be brought about without assistance from government, and it is one in which Pennsylvania has been weighed in the balance and found wanting. Pennsylvania possesses in her bituminous regions some of the highest grade coking coal in the world. In the manufacture of coke two processes are employed, one a process of partial combustion, exemplified in the

beehive oven, the other one of distillation, exemplified in the retort oven. In the one the heat of the ovens and the valuable products of the partial combustion are alike wasted and the atmosphere of the coking regions is polluted with the gases given off; in the other the constituents of the coal, in addition to the fixed carbon, or "coke," are saved, if the retorts be of the byproduct recovery type, or if the retorts are non-recovery, are consumed in the generation of useful heat and power.

In Pennsylvania there were 53,461 ovens that made coke in 1910, and of these 52,165 were of the beehive type; 1,296 were of the retort type with byproduct recovery equipment. The waste resulting from the operations of these beehive ovens runs into millions of dollars annually. In the first place, there is a loss in the coke itself of about 15 per cent., the yield of coal in coke being about 66 per cent. in the beehive ovens and 76.1 per cent. in the retort ovens, a difference in quantity of yield of 10.1, or about 15 per cent. The quantity of coke produced in Pennsylvania in 1910 was 26,315,607 short tons, of which 2,052,973 tons were made in the 1,296 retort ovens. This left 24,263,634 tons as the output of beehive ovens. Now, if this beehive coke had been made in retort ovens the yield (by analogy) would have been increased by about 3,600,000 short tons, which at the average price for Pennsylvania coke in 1910 would have added about \$7,500,000 to the total value. In the waste of the volatile contents of the coal a much larger loss is sustained. The total value of the byproducts obtained in the manufacture of the 2,052,973 tons of retort coke was \$1,455,254, or about 70 cents per ton of coke. Again, by analogy, if all of the coal used in beehive coke making had been charged into retort ovens the total yield would have been 27,860,000 tons of coke, which at 70 cents a ton for the value of the byproducts would have yielded additional revenue to the amount of \$19,500,000. If to this is added \$7,500,000, the value of the coke that might have been made, the total loss amounts to \$27,000,000, a sum of money equal to one half the value of the coke production of Pennsylvania in 1910.

Leaving out of consideration the recovery of the byproducts and taking into account only the utilization of the heat generated in the coking process, let us look at another phase of the matter. The average production of coke in retort ovens in the year 1910 was about 1,600 tons for each oven, so that to produce the 26,315,607 tons of



FIG. 9.—Portion of the retort coke oven plant of Cambria Steel Co., Johnstown. Here all the fumes are utilized and a greater quantity of coke of better quality is produced from each ton of coal.

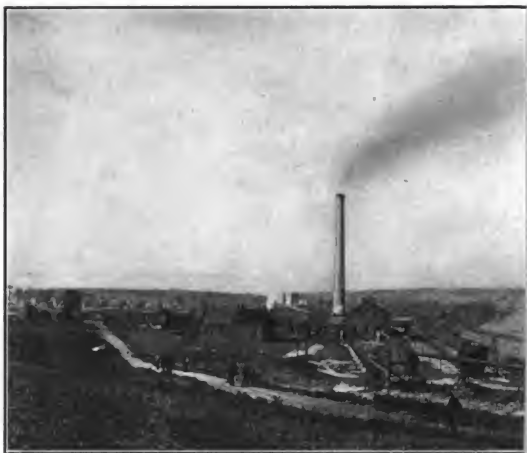


FIG. 8.—Beehive coke oven plant in Connellsville c

coke made in Pennsylvania in 1910 would have required 16,450 ovens. The quantity of power that has been obtained in actual practice from what are termed waste-heat retort ovens is nearly 20 horsepower per hour. If only 75 per cent. of this were obtained the total power that went to waste in the coking regions of Pennsylvania in 1910 amounted to 250,000 horsepower every hour of every day in the year.

The manner in which the atmosphere is polluted by the gases from beehive ovens is illustrated in Fig. 8. Compared with this is a view (Fig. 9) of a portion of the retort-oven plant of the Cambria Steel Company, at Johnstown, Pa., in active operation. The cause of conservation will have made a long step forward when the United States has followed the example of Belgium and Germany, and abandoned forever the beehive coke oven.

CONSERVATION OF HUMAN LIFE IN THE COAL FIELDS OF PENNSYLVANIA.

JOHN L. COCHRANE.

Perhaps no states and but few nations have been endowed with such a splendid heritage of natural resources as the great state of Pennsylvania. Surely, as far as mineral resources are concerned, nature has not bestowed her blessing more bounteously upon any section of equal area.

With the greatest deposits of anthracite coal, that most perfect of all fuels, ever found anywhere, and with an extensive acreage of bituminous coal, comparable in quality with that from any other field and better than most bituminous coals, Pennsylvania years ago found in herself an empire of almost unlimited possibilities. Bringing great industries to her doors by reason of her superb advantage in the possession of such vast mineral resources, Pennsylvania has been equally favored by her proximity to other great fields of industrial activity.

It is no wonder then with such conditions that the mining of coal has in itself become one of the great industries of the State; that this industry has grown through the years at a tremendous rate, practically doubling in size with each decade. To-day the army of miners has reached nearly a third of a million men, to speak accurately 315,030; the annual production of coal, anthracite and bituminous, amounts to 235,006,762 tons, with a value at the mines of \$313,304,812.

Statistics in million figures these days do not seem to convey much, if any, meaning of relative size and it is often necessary, in order to show magnitude, to make comparisons. Using this familiar method of attempting to convey an understandable meaning, allow me to explain that in the combined production of anthracite and bituminous coals, Pennsylvania outranks any of the coal-producing countries of the world except Great Britain and Germany and in 1910 came within five per cent. of equalling the output of Germany. Pennsylvania's production in 1910 was more than five times that of

France and nearly twenty per cent. of the total coal production of the world.

With an industry of such gigantic proportions, rushing along at a tremendous speed, developing so rapidly as almost to double its production every ten years, it is not surprising that problems of a most serious nature have arisen, problems that have baffled and mystified the best equipped men in the industry, and I may say that no other mining state or country has had more complex problems presented for solution. In England, Germany, France, or other coal producing countries there has been no such rapid growth of the industry. The increasing rate of production there has not been so great as to interfere with orderly development. It has been much too great in Pennsylvania.

THE INDUSTRY'S DEMAND FOR MEN.

Not having the rapid growth, the European countries have not experienced the wild rush for men to get out the tonnage; and being without large influxes of foreigners, these countries have employed their home people. The father after working years in the mine has seen his son succeed him; the son later in life has given up his task to his son and so on. And the son has always learned some important lesson from his father.

But Pennsylvania has had an entirely different problem. With several thousand additional men needed each year to keep pace with the demands upon the mines, it has been found necessary to enlist foreigners who had never before in their lives been underground.

In thirty years the industry has grown from one requiring 80,000 men to one demanding 315,000, an average yearly increase of more than 8,000. This increase has been irregular, 3,000 in some years up to 15,000 and nearly 20,000 in others. Pennsylvania has, of course, been utterly unable to supply this increasing demand from within its own borders. How much the State has had to depend, not upon other States, but upon foreign countries, for labor is difficult to tell, but it is certain that for the last thirty years, the great majority of miners have been foreign born, and men as a rule entirely unacquainted with mining. An indication of the preponderance of foreigners is seen in a special report recently issued by the Pennsylvania Department of Mines. In November, 1909, an

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inquiry was made into the nationality of the miners in the anthracite field, and it was found that out of a total force of 173,522 men, 45,692 were born in this country and 127,830 in other countries.

The State Mining Bureau has published statistics of this great industry for a period of thirty years, and to these figures we must look for some light on the general situation. The statistics on anthracite and bituminous mining are given separately in the State reports, but these have been combined to show what has happened in the entire industry.

The figures are as follows:

NUMBER OF MEN EMPLOYED; NUMBER OF MEN KILLED; AND DEATH RATE PER 1,000 EMPLOYED IN COAL MINING IN PENNSYLVANIA
FOR A PERIOD OF THIRTY YEARS.

Year.	No. of Men Employed.	No. of Men Killed.	Death Rate per 1,000.
1881	81,149	291	3.58
1882	93,157	348	3.71
1883	91,359	328	3.59
1884	101,094	391	3.86
1885	107,046	373	3.48
1886	116,294	310	2.66
1887	125,584	354	2.81
1888	140,253	407	2.90
1889	136,262	444	3.26
1890	140,996	469	3.33
1891	150,654	609	4.04
1892	160,893	495	3.07
1893	168,259	519	3.08
1894	174,019	491	2.82
1895	174,227	512	2.93
1896	178,689	610	3.41
1897	182,365	522	2.86
1898	178,974	560	3.12
1899	183,672	647	3.52
1900	202,875	623	3.07
1901	215,935	742	3.38
1902	233,988	701	2.99
1903	253,800	828	3.22
1904	266,109	1,032	3.87
1905	281,322	1,030	3.66
1906	287,926	933	3.24
1907	300,970	1,407	4.67
1908	306,073	1,168	3.81
1909	309,193	996	3.22
1910	315,030	1,048	3.32
Total		19,188	

The figures show that in the thirty years, 19,188 men, or 3.56 in every 1,000 employed have been killed in the coal mines; 3,715 in the first decade, 5,588 in the second, and 9,885 in the third. It is but fair to state that 11,386 men were killed in the anthracite mines and 7,802 in the bituminous mines.

It will be noted from the above table that the percentage of increase in the number of men employed was greater in the first and third decades than in the second, and it is interesting to see that the larger death rates are found in, or directly following, the years in which greater demands were made by the industry for men.

RESPONSIBILITY FOR CONDITIONS.

The essential conclusion then to be drawn from the statistics and the one that is obvious to anyone who makes a careful analysis of them is that the industry has grown too rapidly for the safety of the men; that the demands made upon Pennsylvania for coal have been such that it has been necessary to call upon thousands of foreigners each year, and that the latter's unfamiliarity with mining practice and conditions may have been an important factor in the loss of nearly 20,000 human lives in thirty years.

There has been still another factor in this deplorable situation—a lack of knowledge among at least some of the operators, and mine owners, as to the proper precautions to prevent accidents and the inability of the operators to adopt these precautions when they were known. How much of a bearing this should have on the enormous death roll, it is hard to say.

I am not seeking excuses for the operator, but to be perfectly fair, it must be said that the United States is a young country in mining and mining methods and that the mine owners have not had the same opportunity to learn as those of other countries. And with the newness of the country there has been newness among operators, the same as newness among the untrained, unskilled foreigners, and the combination has been disastrous. Then again, as in every great industry, there have been progressive and unprogressive operators and mine owners. I am satisfied that in the State of Pennsylvania there have been operators (and there may be some yet) who do not have the proper realization of the value of human life, men who do not take the necessary precautions looking toward the safety of their men. Whether they do not know any

better or are simply careless, I cannot say. The results, however, are the same.

On the other hand, there have been many operators who have fully realized their great responsibility in this most difficult problem, and who have displayed an energy and intelligence in coping with it that ought to give them high place among the benefactors of the nation. They have been generals in a great humanitarian campaign, and although they have lost battles, they have not and will not lose the campaign. The men in the coal mining industry of Pennsylvania are not different from the men engaged in other industries. They are as humane as any other class of men. Following great disasters, it is a too popular pastime for sordid newspapers, in an endeavor to inflame the public mind, to shout blaringly from their editorial pages that "the lust for the dollar overshadows the value of a human life." Such a statement is simply unbelievable to a thinking man. No operator wants a disaster, be he progressive or unprogressive, be he humane or not.

There is still another element in the problem that ought to be touched upon here. I refer to the fierce cut-throat competition among the bituminous operators, a competition often so desperate as to make impossible a profit on the operators' investment, clean mining, or the adoption of proper safety appliances and precautions.

WHAT ABOUT CONSERVATION OF LIFE?

The problem stated, and it is as tremendous a problem as any State has ever been called upon to solve, what has Pennsylvania been doing toward a conservation of human life in the coal fields?

The records that are available show that heroic efforts have been made for years against fearful odds to stem the rising tide of death. The operator, as a rule, has given everything in him to the cause; the State Department of Mines has worked unceasingly and with a vigilance born of desperation; the miners have coöperated to the best of their knowledge. And yet, with all these forces working earnestly, the industry has not until within the last few years make any appreciable gain in its fight with death. At times, the men whose hearts are in this great industry have taken courage at a lull in accidents, only to be met by the specter of some great disaster, with terrible loss of life. The more progress the industry

seemed to be making, the more new difficulties, mysteries, you may call them, seemed to arise.

Undaunted, however, the operators, the State Department of Mines and the miners have continued their struggle, and it must be that they have at least prevented greater tragedies. It is appalling to think what might have happened had it not been for the efforts of these agencies. The operators early realized their greatest problem—the unfamiliarity of the foreign miners with the methods of mining coal, and their energies were bent toward educating these strangers, not only in the actual mining of the coal but also in avoiding the dangers that come to men who do not know.

EDUCATION FOR THE MINERS.

Around these first efforts of the operators there has grown up a splendid educational system, which includes mining schools, mining Y. M. C. A.'s, mining institutes, rescue corps, and first aid corps. No other State in the Union is so well equipped in this respect as Pennsylvania, and the credit must go freely to the operators for their generosity in this great humanitarian movement. These agencies, since they were established, have undoubtedly been responsible for the saving of several thousand lives, and the only reason the records do not show much if any improvement in the death rates, except for the last few years, is that the influx of foreign miners has been greater each year than could be properly assimilated. One can readily appreciate the difficulties encountered. With the schools caring for 3,000 miners from the older countries in one year, they would hardly be ready to receive 10,000 or 15,000 or 20,000 strangers the next year. And yet the industry has made these demands year after year upon the schools.

The schools operated by the mining companies have done an inestimable amount of good, and especially in the anthracite region where such methods are much farther advanced than in the bituminous fields. The teaching which the miners have received has not only made them practical miners, capable of avoiding the dangers, but has also aided them in becoming desirable American citizens.

The State Young Men's Christian Association of Pennsylvania, under the efficient leadership of Mr. Charles L. Fay, the mining secretary, has shared honors with the mining company schools in

this educational campaign. There is no similar organization in the State that has done so much, and is doing so much, for the toilers in any industry. If any one wishes to see the real workings of a practical philanthropy where the brotherhood of man is exemplified in its highest type, let him attend the classes to miners in one of these Pennsylvania Y. M. C. A.'s. The earnestness of the foreigners, their honest desire to learn and the gratitude they show are bigger dividends to a monied philanthropist than he can get from any of his investments.

The coöperation of the mining companies and the Y. M. C. A. recently resulted in the publication by the Delaware, Lackawanna & Western Railroad Company of a simple primer on "Mine Accidents and Their Prevention," which is by far the best production of its kind ever issued in the State. The little book is for the instruction of mine workers and is especially adapted for the teaching of English to non-English speaking people. The book was prepared by J. H. Dague and S. J. Phillips, secretaries for the education of mine workers, Y. M. C. A., Scranton, Pa., under the direction of R. A. Phillips, superintendent, and C. E. Tobey, assistant superintendent, coal mining department, D. L. & W. R. R. Co. The aim of the book is to give the non-English speaking miner a good understanding and use of the language used in the mines and it will not fail in its purpose. The lessons start with the alphabet and then take up, in the simplest possible language, the dangers common to the mine, illustrating with photographs what the miner should not do and what will happen if he does do it. The book closes with the American flag illustrated in colors and a few lines explaining what is necessary in order to become an American citizen. Altogether it is a splendid aid in the education of the foreigner who comes to this country to engage in mining.

FIRST AID TO THE INJURED.

The first aid movement has been another important factor in this campaign against death in the mines. And in this Pennsylvania again leads all the States, having at its mines, especially in the anthracite fields, a thoroughly trained, skillful army of men capable of acting wisely and humanely in almost any emergency where men are injured. Pennsylvania's supremacy in this movement is a strik-

ing illustration of the great amount of good that can be accomplished by a man with a single purpose. Dr. M. J. Shields, of Scranton, Pa., with the assistance of twenty-five miners employed in the Delaware & Hudson Company's mine at Jermy, Pa., succeeded in organizing the first first-aid corps for mine work in America. From this beginning, in less than ten years, practically every coal company in the anthracite field was equipped with first aid in some form in and about their mines. This life-saving service attracted the attention of the entire country and led to the organization of a first aid department of the American Red Cross in charge of Major Charles Lynch, Medical Corps, U. S. Army. Doctor Shields was engaged by the society to demonstrate the first aid work which is now being carried into all the industries where there is any great amount of hazard.

Under the auspices of the Red Cross Society, yearly contests between the first aid teams of Pennsylvania are held and medals are given to the corps showing the most skill and proficiency. This offers a fine incentive to the men and is in a way responsible for an enthusiasm that continues through the year. It is undoubtedly true that the prompt care and treatment of the injured miners by these corps has saved the lives of many miners and has prevented the permanent injury of others.

The efforts toward conservation of life in the coal fields of Pennsylvania have been aided powerfully by another agency, the Department of Mines of Pennsylvania. Under the able direction of James E. Roderick, the sturdy, rugged, chief inspector of mines, this organization has consistently and intelligently fought against bad practices in the mines and has patiently and persistently insisted upon the introduction of methods leading toward greater safety among the men. Chief Roderick has been assisted in this responsible undertaking by a conscientious corps of hard-working, fearless inspectors, men who placed their duty above everything else. They have gone about the mines like ministering angels, advising here, admonishing there, and finally, whenever it became necessary, insisting, even in the face of opposition, that their recommendations be carried out at once. They too have been a power for great good in the industry.

Following great disasters, when the public mind is inflamed, the

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desire to prevent loss of life in the future from similar causes takes the form of proposed legislation. Unfortunately, many members of the legislature do not have a sufficient knowledge of the difficulties encountered in mining to prepare legislation of the kind that will be helpful, and some of the plans proposed are often positively detrimental to the industry and do not aid in saving life. In such instances, the Department of Mines of Pennsylvania has been a steadying, guiding influence. It is a safe assertion that the wise recommendations of the department have prevented much useless and harmful legislation from appearing upon the statute books and have resulted in much beneficial, remedial legislation.

THE BLACK RECORD OF 1907.

The darkest year in the history of Pennsylvania mining came in 1907. It seemed to be the climax of a series of unfortunate years. Altogether, in 1907, fourteen hundred and seven men were killed in the mines, which was 4.67 in every 1,000 men employed. A number of great disasters occurring in the State that year swelled the death list and called attention as never before to the conditions. Operators, mining engineers and miners alike were discouraged. After years of determined effort, the conditions were getting worse, not better. It seemed in some instances that the calamities insisted upon visiting the mines where the operators had been most humane, had done everything within their knowledge for the safety of their men. The disasters were shrouded in a mystery that seemed unfathomable. It was at this time that the greatest disaster in the history of American mining happened, not in Pennsylvania, but in the sister State of West Virginia, at Monongah. Three hundred and fifty-six lives were lost. The officials were stunned. Up to that time, the cause attributed to practically every mine horror in this country had been an explosion of gas. There had never been gas in dangerous quantities at the Monongah mine, the officials declared. A few days before this catastrophe there had been an explosion at the Naomi mine, near Fayette City, Pa., in which thirty-four lives were lost. Ten days after the Monongah disaster there occurred at Yolande, Alabama, an explosion which resulted in the death of fifty-six men. Three days later, on December 19, a great disaster occurred at the Darr mine near Jacobs Creek, Pa.,

in which two hundred and thirty-nine men were killed. The entire nation was shocked at this series of disasters. The agitation that followed resulted in Congress making an appropriation for an investigation of the causes of mine explosions, and this later developed into the United States Bureau of Mines with Dr. Joseph A. Holmes as director.

Then came the turning point. The death roll began to decrease, not only in Pennsylvania, but in the United States generally. It is too early to make a definite statement as to how much of the improvement is due to the Bureau of Mines. Undoubtedly the agitation throughout the country following the four explosions caused operators and miners to exercise a greater degree of care and this had some effect in cutting down the death rate, but the Bureau of Mines did its share in this great work and was unquestionably a large factor.

The statistics for the last few years, including 1907, show the improvement in Pennsylvania in the following manner:

Year.	No. of Men Employed.	No. of Men Killed.	Death Rate per 1,000.
1907	300,970	1,407	4.67
1908	306,075	1,168	3.81
1909	309,193	996	3.22
1910	315,030	1,048	3.32

THE EXPLOSIBILITY OF COAL DUST.

The numerous disasters that had occurred in bituminous mines comparatively free from gas brought the first big problem to those who were charged with carrying out the investigations for the federal government. Doctor Holmes was of the opinion that many of these disasters had been caused by the explosion of the coal dust. Some of the European coal producing countries had reached the conclusion several years before that coal dust was even more dangerous in a mine than gas, but there seemed to be no unanimity of opinion. Operators generally in the United States did not believe that coal dust would explode and very little if any attention was being paid to the accumulation of dust in the mines.

The Department of Mines of Pennsylvania realized the situation, even if the operators did not. In the bituminous report for 1906 is the following:

18 *Conservation of Human Life in Pennsylvania Coal Fields.*

"Until recently the danger to be apprehended from the accumulation of dust in the mines has not been appreciated. It is well understood, however, that dust mixed with a small proportion of gas is a menace to life and property, and cases are on record of dust having caused explosions by a blown-out shot when no evidence of gas was shown by the safety lamp."

Chief Mine Inspector Roderick in this same report urged a more effective system of wetting the coal dust, but in spite of the belief of the chief inspector in the explosibility of coal dust and his warnings, there was no generally definite opinion among the operators as to this danger.

Satisfied in his own mind that coal dust was the cause of the big recent disasters, Doctor Holmes proceeded to demonstrate the explosibility of the dust to the satisfaction of operator and miner. When the investigations were begun, an experiment station was established in Pittsburgh. A steel tube, 100 feet long and six feet in diameter, was erected in which to demonstrate the danger of coal dust, and on the opening day for the station, experiments were made in the presence of several hundred operators, many of them doubters, that forever settled the coal dust problem in the United States. The operators responded at once to this new situation and made provisions to have the dust in their mines cared for. To-day, the system of sprinkling or humidifying the mines is quite generally in vogue in dangerous mines and one big cause of accidents has been greatly lessened.

THE DANGER OF BLACK POWDER.

It was found in the experiments conducted by the federal government that black powder never failed to ignite bituminous coal dust and this led to the determination to find explosives that would give the miner some degree of safety in the event of a blown-out shot. The result of this has been the development of the short flame explosive. More than thirty types of such explosives have been tested by the Bureau of Mines and such excellent results have been obtained that these explosives have been placed upon what is known as the "permissible list," and their use recommended to operators who have gaseous or dusty mines. The Pennsylvania operators, continuing that splendid spirit of coöperation with the Bureau of



FIG. 1.—Explosion of coal dust in a steel tube at the National Mine Safety Demonstration held in Pittsburgh.



FIG. 2.—The wonderful oxygen reviving apparatus which has been responsible for the saving of a number of lives. Each rescue car of the Bureau of Mines is equipped with one or more of these devices.

Mines that they had shown in adopting the recommendations on the coal dust question, began the extensive use of permissible explosives, and another factor in the cause of accidents has been at least partially eliminated.

The hearty response made by the operators to the recommendations of the Bureau of Mines has been a source of gratification to that bureau. It is a splendid tribute to the progressiveness of the Pennsylvania coal operator and refutes the charge so frequently bandied about that the operator does not care for the safety of his men. It further proves the contention that the cause of the big death rate was, aside from the employment of unskilled foreigners, a lack of knowledge on the part of the operators, due, no doubt, to the fact that mining in this country is not as old as in some others.

Another pleasing feature is the fine spirit of coöperation shown by the State Department of Mines. Chief Inspector Roderick has not only indorsed the recommendations of this bureau, but has used his best endeavors to have them put in practice. He has generously noted in his annual reports the work of this bureau and has in other ways aided in promulgating its findings. His inspectors too have shown a spirit of friendly helpfulness that means big accomplishments along the right lines. Altogether the outlook is very encouraging for a much lower death rate in Pennsylvania mines and also throughout the United States.

An index of the progress being made in Pennsylvania mines is seen in the following from Chief Inspector Roderick's bituminous report for 1910:

"The total number of mines of the bituminous region is 1,464.

"There are 232 mines in which permissible explosives are used exclusively.

"There are 78 mines in which permissible explosives are used in parts of the mine.

"There are 35 mines in which the use of permissible explosives have been discontinued.

"There are over 500 mines in which permissible explosives should be used.

"There are only 27 mines where rooms and entries are thoroughly watered.

"There are 210 mines where rooms and entries are partly watered.

"There are 120 mines in which coal dust is properly cared for.

"There are 145 mines in which coal dust is partly cared for.

"There are 196 mines which in the opinion of the inspector should be thoroughly cared for by water for the dust.

"There are over 100 mines in which safety lamps should be used in addition to where they are used.

"The department has instructed the inspectors to enforce the use of permissible explosives in all mines and see that the dust is properly cared for, and that rooms and entries are thoroughly watered, whenever in their opinion these things are necessary for the safety of life and property."

MODERN RESCUE WORK.

When the Bureau of Mines started its work, it found a chaotic condition in rescue work throughout the country. Pennsylvania was not the worst State in the Union in this respect, for the first aid work, which is a valuable auxiliary to rescue work, was farther advanced in the anthracite fields than in any other place. There was, however, generally lacking everywhere suitable apparatus that would permit rescue work to be carried on with any degree of safety. The too common tale of a mine accident was that the rescuers were killed. Director Holmes bent his energies to stop this waste of life, as one step toward reducing the death rate and he found a valuable aid in the oxygen helmet, which permits one to enter an atmosphere of poisonous gases and breathe artificially for a period of two hours. Rescue stations were established by the bureau in a number of the big coal fields and these were followed by rescue cars, ready to proceed at a moment's notice to the scene of a disaster. The stations and cars were placed in charge of practical miners with years of experience back of them. First aid work was added and a little later came a wonderful oxygen reviving apparatus for asphyxiated miners, which has succeeded in saving quite a number of lives.

Two of the seven cars operated by the bureau are stationed in Pennsylvania and the principal station is in Pittsburgh. These cars have gone into the various coal fields and the miners have been trained in the use of the different apparatus and also in first aid. Pennsylvania operators have not been lacking in interest in this



FIG. 3.—Typical scene at a mine disaster. Widows and orphans waiting for the bodies to be brought up from the mine.



FIG. 4.—Mine rescue corps of the United States Bureau of Mines.

phase of the work. The result is that both in the anthracite and bituminous fields there are completely equipped rescue stations manned by thoroughly trained miners and also first aid corps. The anthracite region no longer holds the monopoly on advanced methods. Some of the most complete rescue stations to be found in the country are located in the bituminous fields.

This work of course must be extended, but sufficient has been accomplished to make almost certain that the death rate in the mines will continue to decrease. The mortality statistics for 1911 are not yet ready, but every indication points toward less men killed in Pennsylvania than in 1910.

The conservation of human life in the Pennsylvania coal fields is a movement that is getting bigger with every year. It means that more fathers are to be spared to their families in the future; that there will be less sorrow and suffering, less poverty and wretchedness, less expense to the people and to the State in caring for widows and orphans. It means that one of the most hazardous occupations is slowly being robbed of some of its worst terrors. Coal mining will always be a dangerous calling, but the time is coming when our death rates will not be a national disgrace, and the comparison of mortality statistics with foreign countries will not be so frightfully in their favor.

THE CONSERVATION OF WATER IN PENNSYLVANIA.

FARLEY GANNETT,

ENGINEER, WATER SUPPLY COMMISSION OF PENNSYLVANIA.

Conservation is intelligent and beneficial utilization, according to which definition the conservation of the water supply of the commonwealth of Pennsylvania means its best and fullest use, for the purpose to which any particular stream or river may be adapted. It does not mean the use of a stream for water power which is required and needed for water supply to a greater extent than for water power; it does not mean the holding of a stream, unused, in contemplation of its future employment by a water company or municipality, while at the same time another nearby community may be suffering for an immediate supply from this stream; and it does not mean the hoarding of all the water in one stream until the arrival of some possible condition of circumstances which might in the future require its use at one point for water supply purposes, while at the same time the stream would offer attractive results from immediate water power or some other form of development. In order, therefore, to effect true utilization of the waters of the commonwealth, it is necessary to be familiar not only with the available streams and the water which is carried thereby, but with present and probable future economic conditions. The proper adjustment of the one to the other must be the aim of the conservationist.

Many of our streams are entirely unused, with little prospect of being needed, except for agriculture; others are unused because they are being held for future requirements, while still others are used to their utmost capacity, feeding into one storage reservoir after another, and wasting but little water throughout the year. Many sections of the state are well and amply supplied with water, others are but poorly supplied, while in still others it seems that to furnish an ample quantity of water of a proper quality is almost an impossibility, with the resources which can be made available.

Not a great deal has appeared in print heretofore regarding this

subject in Pennsylvania, and unfortunately there are those who do not know, and therefore cannot appreciate, the extent of the work done by the state organizations which are conserving the waters. In 1905 two acts were passed by the legislature, one to preserve the purity of the water supplies, and the other to distribute and regulate the utilization of the streams. To the State Health Department and the Water Supply Commission was delegated the duty of carrying out the provisions of these acts, and these two departments of the state government have been in active and efficient operation for nearly seven years, and have accomplished practical results. Their work has not been alone theoretical nor prospective, but from day to day and month to month and year to year definite things have been accomplished. Impurities have been eradicated from streams, the public health has been improved by reason of purer drinking water, available sources of supply have been granted and utilized along the best lines for the supply of communities, the most suitable streams have been allotted to the communities to which they are best adapted, water powers have been developed in accordance with approved designs affording the best utilization of the available power. At the same time a thorough knowledge has been acquired of the streams both as to the location, the quality and quantity of water flowing therein, the use to which they are being put and to which they are best suited for future utilization. The quantity of flow of nearly one hundred streams is being determined daily, at points in all parts of the state. Economic conditions have been carefully studied in the congested sections of the state, where the water question is an immediate one; so that these two departments hold within their grasp knowledge which can only result in intelligent conservation of the water.

That the waters of Pennsylvania are used largely is indicated by the fact that there are now operating in the state over 750 separate systems of domestic water supply, operating in all of the 30 cities, 541 of the 834 boroughs and in numerous unincorporated towns, including a population of 4,500,000 or 58.7 per cent. of the population of the state. There is no single community of over 2,500 population not so supplied. No other state has so large a number of water supply systems as has Pennsylvania.

With respect to developed water powers our position is quite different. Only within recent years have any large utilizations been

effected, and, of approximately 100 water power companies incorporated, only about 25 per cent. have constructed works. Our streams are used by multitudinous grist mills, whose total of installed horsepower is large, but such plants are inefficient, wasteful, and utilize but a fraction of the available power, and their number is decreasing rapidly.

It has been my privilege to have been connected with the State Water Supply Commission practically since its formation, and it is, therefore, more with what has been accomplished in the line of utilization, rather than of purity, that I am familiar, and naturally, therefore, this article will be confined more to this branch of the subject.

Water should be conserved for six purposes; or, in other words, in controlling the utilization of water, the question must be examined from six standpoints; namely, (1) for water supply; (2) for water power; (3) for navigation; (4) for the control of floods; (5) for agriculture, and (6) for the preservation of natural scenic beauties. The practical utilitarian generally will omit the sixth consideration, and from the standpoint of the State Water Supply Commission the other five have been conceded to have greater prominence if conflict should arise.

Water Supply.—The utilization of water for the supply of communities for domestic and manufacturing use and for fire protection is considered paramount to all other uses, and where conflict arises, it is given predominance, but, at the same time, this use should not prevent the utilization of the waters for the other purposes. On account of the variation in the flow of the streams from season to season and year to year, due to the unequal distribution of rainfall and other climatic conditions, the full use of the water of a stream by a public water supply system cannot be obtained unless the large volume flowing in wet seasons can be held to be used in drought seasons; therefore, conservation of water for this purpose means storage, and through storage it is possible to supply large communities from comparatively small streams, so that the aim of the commission has been, and it has had the opportunity to put it into practice on numerous occasions, to provide for the storage of water by water supply companies. The result of this practice is that a community, through storage, may be supplied by the run-off from one watershed while other nearby watersheds may be used for the

generation of power, etc., rather than all the streams in the vicinity of a town being used to the extent of their dry weather flow without storage, preventing the use of any of them for any other purpose.

Water Power.—After it has been found that a stream is not and probably will for many years, and perhaps for generations, be required for use in supplying water for municipal purposes, it becomes available for water power, navigation or flood control, and the question must be then solved as to which of these predominates, or as to whether the stream cannot be used for all three purposes harmoniously. Our investigations have led to the belief that the three uses can be harmonized.

Large rivers, even with their variable discharge, have been in recent years utilized for water power, while at the same time very small streams, through storage, are making valuable water power developments. The users of variable flowing rivers are becoming more and more convinced, however, that the control of their discharge through storage is essential, thus preventing the vast volumes which pass down these rivers in the winter and spring from serving no useful end. With a small stream on which a high fall can be obtained, comparatively more money can be spent for storage, per unit of volume, than on a large stream where only a low head is available, and as the water power plants on our many arteries are now located, storage is hardly economically practical. There are but few water power plants on the main streams, and they are distributed far apart, and the total head through which water stored in the upper sections of the watershed can be utilized by existing plants is hardly sufficient to pay for its storage.

The state is not provided with laws such as would permit of the storage of water by private individuals on the upper reaches of the streams, and assessment thereby of the various users below according to the resultant benefit. We, therefore, have in Pennsylvania no instances of the storage of water on the large rivers for the benefit of water power plants below. The question is, therefore, a pertinent one, regarding the best form for legislation to aid in this regard; should that legislation provide for the construction of these reservoirs by the state and the assessment of benefits to the lower users, or should it provide for the incorporation of companies to fulfill this duty? There is at present an active interest in the construction of water powers on large streams involving unusual vol-

umes of storage, which storage will in turn reduce floods and aid navigation.

The water powers of Pennsylvania are not developed to such an extent as are those of many other states, and inquiry has shown several reasons why this is the case. These causes will continue to operate against the rapid utilization of the streams of this commonwealth. In the first place we are a commonwealth noted for its fuel production. We produce practically all of the anthracite coal mined in the United States, while at the same time we produce vast quantities of bituminous coal and petroleum. Pennsylvania is, therefore, known as a state wherein power should be cheap, because the transportation of coal becomes, at a considerable distance from the mines, the largest single consideration in its cost. Therefore, capital is not drawn easily into the production of water power in most parts of Pennsylvania. Again, the river valleys in this state have, with few exceptions, been devoted to rail transportation, and with few exceptions also, the large streams are paralleled by railroads. Thus in order to erect a dam for the generation of power or for the storage of water for power purposes on such streams, a conflict arises between the transportation and water power companies, and even though the controversy might be settled, the cost of re-locating the railroad would add materially to the cost of producing the power. Furthermore, our climatic, topographic and geologic conditions are such that the flow of Pennsylvania streams is most erratic and undependable, reaching great heights in flood and extremely low minima in drought, and, therefore, increasing the cost of development to figures which are not, under the other conditions existing, economically practicable.

A water power site to-day was a few years ago not considered as a site for the development of power. Heretofore one looked for waterfalls, rapids or steep grades for the location of such a plant. To-day, with the appreciation of the necessity and value of storage, a broad, level and long valley, with a favorable narrow dam site location, without railroad influence and wild, thinly inhabited valley, is desired. High dams are erected, flooding many miles of the valley and the head is the height of the dam. When future years have brought numerous such developments, the flow below will be to a degree regulated, minimum flow greatly increased, and the rapids and waterfalls will regain their former preference.

Navigation.—At one period in the history of the commonwealth of Pennsylvania, the utilization of the river valleys for navigation was extensive. The Delaware to Easton, the Lehigh to Mauch Chunk, the Schuylkill to Port Carbon, the Susquehanna to Sunbury, the North Branch throughout the state, the West Branch beyond Williamsport, the Juniata to its headwaters, the Conemaugh and Kiskiminetas throughout their length, the Monongahela to the state line, the Ohio to Pittsburgh, the Allegheny to Kittanning, and portions of Swatara creek, Conestoga creek, Codorus creek, Tulpehocken creek, Bald Eagle creek, Wissahickon creek, French creek, the Beaver river and the Mahoning river, as well as some few others were made navigable by canals or slack water. To-day only portions of a very few of these streams are used for navigation. The Delaware to Trenton, the Ohio to Pittsburgh, the Monongahela and a portion of the Allegheny, are the only streams that are navigated regularly and to any material extent. The Delaware canal up to Easton, and the Lehigh and the Schuylkill carry a small traffic.

The day of water transportation ceased when the parallel railroad became practicable. It may be that other generations, finding new conditions to meet, may revive this mode of transportation. There are some streams upon which improved navigation may be beneficial, and prove economically successful. This question has been carefully considered, and the commission is improving the condition of the river channels, causing river banks to be protected from wash, preventing unnecessary obstructions therein, and requiring, where bridges are built across such streams, that in the event of the improvement to navigation, draw spans or other means for the passage of boats shall be provided by the parties building such bridges. This is, of course, looking far in the future, but it may be that the requirements thus provided may be the key to the situation in future years.

It is quite possible that with the further utilization of the water powers of the great rivers, which utilization requires quite generally the construction of dams of considerable height, navigation on such rivers may be developed. In other words, the construction of a series of dams across the Susquehanna river from tide water to Harrisburg, which might be possible some day in order to develop the available water power, would result in slack water navigation throughout this extent, if the control of the placing of those dams

is guided by a state authority, which has the future navigation of this stream in mind. Going one step back, we find that the storage of water would result in the development of more water powers, the development of water powers on the other hand may aid navigation.

Flood Control.—Not only is water wasted when the freshets come in the winter and spring, but when the precipitation is exceptionally heavy and streams rise in flood, damage is done to land, buildings and bridges, and even loss of life may result. It is held that there are two ways by which excessive run-off at such times may be prevented; by protecting our forest growth and replenishing it, and by the construction of storage reservoirs. We believe this to be true particularly with respect to the latter. The former is probably of more value to the stream in increasing the dry weather flow, and through the reduction of the frequency of ordinary high water, than it is in the amelioration of excessive floods. The storage of water for water supply purposes and for water power purposes will, in a small measure, aid in reducing flood heights, but unless the design of such storage reservoirs is made with the control of floods in mind, little will be accomplished in that direction. The commission has had opportunity to affect this modification in the design of large reservoirs for water power purposes, so that they will effect approximately complete control of the floods, both great and small, from the watershed lying above the reservoir. This is true conservation.

Agriculture.—It is considered that the use of the water courses for agriculture is an important function, but as our precipitation is so well distributed and ample, the day when storage for agricultural purposes, on a practicable basis, is far in the future.

The Preservation of Natural Scenery.—Pennsylvania is endowed with many spots where the beauty of the landscape is improved by the presence of flowing water or quiet lakes. Few of them have been injured by the utilization of the water. Many of them have been spoiled by the utilization of other natural resources, or by the construction of railroads, etc. On the other hand, many beautiful lakes have been created by the storage of water, and some impressive water falls have been created by the construction of high dams.

Streams as Waste Carriers.—There is one use to which the streams of Pennsylvania have been quite largely devoted, and which it is held is not a proper purpose for which to utilize them; that is

the carrying, in unrestricted quantity, the waste from factories and mills, culm from mines, ashes and other refuse from cities and unpurified sewage. This is the only use to which numerous Pennsylvania streams are applied. The rivers and creeks of the anthracite coal region below the mouths of the mines and in the bituminous coal region are unfit for any use owing to the culm or acids which are carried. These substances, entering the larger waterways, affect them also to a less extent. The commission is doing what it can to prevent the dumping of unnecessary wastes into the streams, and the Department of Health is likewise preventing the discharge of sewage in an unpurified state therein.

At the basis of water conservation in general and certainly in Pennsylvania, is storage, and this fact cannot be too often repeated or too much emphasized. Whether for water supply, water power, navigation, or for the reduction of floods, storage is the ultimate consideration. Through storage in reservoirs alone can the ultimate utilization of the streams be accomplished and we certainly see benefits being derived from it. The commission is now, in response to an act passed by the legislature in 1911, surveying a large unproductive swamp in Crawford county, covering nearly 25 square miles, to determine the cost and practicability of utilizing it as a vast storage reservoir to provide a sufficient dry weather flow in the Shenango and Beaver rivers, which drain it, to support the population and industries of the lower valley. It is hoped that this reservoir will provide water for domestic and manufacturing use, improve existing and create new water powers, reduce the destruction wrought by floods, and aid navigation in the Ohio river. It would also improve the natural beauties of this valley by creating a lake far larger than any now existing in Pennsylvania, and by keeping the lower channel always well filled and carrying off the debris and wastes with which a river bed is always encumbered in thickly settled districts.

SOIL RESOURCES OF PENNSYLVANIA AND THEIR CONSERVATION.

FRANK D. GARDNER,

PROFESSOR OF AGRONOMY, STATE COLLEGE, PENNSYLVANIA.

The soil of Pennsylvania is a great asset. Some men will tell us that the extent of soil in this Commonwealth is not so great as that of some of our great agricultural States. Neither is it so level or fertile, but they fail to note that many farms in Pennsylvania may be cultivated and cropped on both sides. Whether this is an advantage or disadvantage, the fact remains that acre for acre, on an average, Pennsylvania produces more corn than Illinois, more oats than Indiana, more wheat than Minnesota or the Dakotas, and more buckwheat than any of the above-named States. When her crop-producing power is compared with that of the great agricultural States it seems that Pennsylvania has a comparatively high rating. But we must not lose sight of the fact that the labor and fertilizer annually applied to each acre of corn in Pennsylvania is valued at \$13.64, as compared with the much lower labor and fertilizer cost of \$6.86 for each acre in Illinois. On the other hand, if we compare Pennsylvania crop yields with those of England, Germany and some other European countries, our conceptions are greatly extended relative to the possibilities of land. In Great Britain, the average yield of wheat is 33.9 bushels per acre as compared with 16.3 bushels in Pennsylvania. The yield of oats is 45.1 bushels, as compared with 29.4 for Pennsylvania, while that of potatoes is 194 bushels against 85 for Pennsylvania.

According to the census for 1910, the population of Pennsylvania was 7,665,111 and the area of improved land was 12,673,579 acres, or an average of only 1.65 acres per capita. Sixty years earlier the population was only 2,311,786, or less than a third as much as in 1910, and the improved land equaled 3.73 acres per capita.

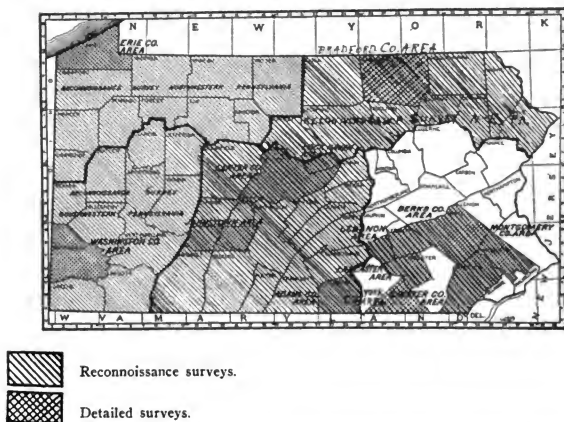
POPULATION, FARM ACREAGE, NUMBER OF FARMS AND ACRES AND VALUE PER ACRE FOR PENNSYLVANIA FOR 60 YEARS AS REPORTED BY THE CENSUS FOR 1910.

Census Year.	Population.	Land in Farms.		Number of Farms.	Average Acres per Farm.	Average Value per Acre, Land and Buildings.
		All Land. Acres.	Improved Land. Acres.			
1850	2,311,786	14,923,347	8,628,619	127,577	116.9	\$27.33
1860	2,906,215	17,012,140	10,463,296	156,357	108.8	38.92
1870	3,521,951	17,994,200	11,515,965	174,041	103.4	46.39
1880	4,282,781	19,791,341	13,423,007	213,542	92.7	49.30
1890	5,258,113	18,364,370	13,210,597	211,557	86.8	50.22
1900	6,302,115	19,371,015	13,209,183	224,248	86.4	46.37
1910	7,665,111	18,586,832	12,673,519	219,295	84.8	56.01

From the above table it may be seen that increase in population in Pennsylvania has far exceeded the increase in acreage of improved land. Population has more than trebled in sixty years, while the acreage of improved land has increased less than one half. In the same period the number of farms increased 72 per cent., but the average size of farms decreased 28 per cent. In the sixty years land values, including buildings, have a little more than doubled. Since 1870, however, there has been a rise of less than ten dollars per acre and it is probable that the major portion of this is due to increase in buildings rather than rise in land alone. This small rise in land is not commensurate with increased values along other lines of business, nor is it in keeping with the increased values of farm produce, or the increase in land values for the country at large, which in the last ten years has equaled 117 per cent. These facts indicate that Pennsylvania should, and probably will, experience a marked increase in land values in the next ten or at most twenty years. With it will come the demand for larger yields to meet the demand of constant and rapid increase in consumers. This will necessitate an increased yield per acre which will demand greater soil fertility and a rejuvenation of many acres in a now badly worn condition.

The first step in this process is a clear conception of the properties of soil in relation to plant life and a classification of the soils of the State. Such a classification has been in slow progress for more than ten years, first, under the direction and at the sole expense of the federal government and more recently in cooperation with the school of agriculture and experiment station of the Pennsylvania

State College. This soil classification and mapping is of two types. First, a reconnaissance soil survey in which only the soil series or broad differences are recognized and mapped, and second, the detailed soil survey in which the minor differences and crop adaptations are recognized. The State has coöperated with the federal authorities in the reconnaissance work from its inception. The work began in the summer of 1908 when eleven counties in the



Sketch map of Pennsylvania showing reconnaissance and detailed surveys prior to 1912.

northwest part of the State were surveyed. It has continued each year and 1912 will see the completion of the field work. Two reports on the reconnaissance work have already been issued, one for northwestern Pennsylvania and the second for southwestern Pennsylvania. Two more are now in press and will become available to the public in the course of time. The reports are accompanied by maps on a scale of one inch to four miles, showing the location and extent of the soils as classified. The text fully describes the

soils and discusses the crop adaptation and farm practice as found on each. It also makes recommendations relative to improving soil and agricultural conditions.

The detailed soil surveys, in which State College has coöperated with the federal government since 1906, now cover thirteen counties or similar areas scattered over the State, as shown on the preceding sketch map. In these the maps are made on the scale of one inch equals one mile and all soil differences, down to areas not less than ten acres in extent, are shown. The soil types are described in detail and full discussion is devoted to crop adaptation, agricultural practice, market facilities and methods for improvement. All reports thus far in print on either reconnoissance or detailed soil surveys have been published by the Bureau of Soils, U. S. Department of Agriculture, Washington, D. C., and copies, excepting when out of print, may be secured by addressing the United States senator or congressman of the district in which the survey report desired is located.

In addition to the above, the U. S. Bureau of Soils detailed a fruit soils specialist at the expense of the Pennsylvania State College and Experiment Station to spend one year in study and make report upon the fruit soils of our State. The report, now in press, will be issued by the Experiment Station at an early date.

Knowledge of the soils, gained by systematic study as above briefly described, is fundamental to a better and more profitable agriculture. It forms the foundation for further study of plant and animal production by the agricultural scientist and the farmer, not for the benefit of the farmer alone but for the benefit of every citizen of the State.

This work is already of material assistance to the College and Experiment Station staff in advising a more rational farm practice in many parts of the State. Before it can be fully utilized, however, outlying field experiments must be established on each of the soil provinces, the nature of which in the course of time will establish new truths from which will spring a more profitable agriculture and a higher type of farmer and citizen.

The agricultural conditions of Pennsylvania as a whole compare favorably with those of the adjacent States, but there are localities where the agricultural practice is not developed as the normal soil resources and market demands for produce would justify. Such

conditions generally prevail over much of the region under which petroleum and gas occur.

The exploitation of these resources has worked an economic evolution to such an extent that all other interests are made of secondary importance and agriculture in many cases has actually declined. In such regions there is a noticeable lack of enthusiasm for farming as a business, and yet this attribute is as essential to success in farming as it is to the success of any other business. Business methods applied to the cropping, tilling and fertilization of the soil and also to the marketing of the products would be relatively as effective as such methods applied to other forms of business.

Sound judgment in adapting farm areas to their several uses is the keynote to profitable farming in many parts of the State. Not only is this true from the standpoint of the character of the soil but more particularly from the nature of the topography. Many farms that show much variation in this respect should be divided into (1) tillable lands, (2) pasture lands, and (3) forest lands. The plans for the management of each of these should not be permitted to encroach one upon the other. If the distinct areas are not properly balanced, forest land or pasture land may be sold for the purchase of tillable land or vice versa.

The management from the standpoint of soil conservation is especially urgent in case of the cultivated areas. It is on these that the greatest degree of erosion occurs. At the same time such areas should be the most productive. Cropping systems should be made to conform to soil conditions. An economic loss always follows a failure to make such adjustments. Corn, oats, and wheat each one year followed by clover and grass from one to several years is the most usual rotation. This has been a standard rotation for many years. In general, it is a good rotation but there are many places where farmers would do well to change it. In some localities, there is complaint that oats are no longer profitable and where this is true they may well be eliminated from the rotation. There should be a specific advantage obtained from each crop grown, either by direct profit or in part from soil improvement. In the standard rotation, corn is the only cultivated crop. It has been profitable, is profitable now and will continue to be so under good soil management. In certain localities, potatoes may be substituted in part for corn and like the latter demand good soil conditions for success. While both

of these crops demand good soil they both tend to soil improvement by virtue of the tillage they demand, providing erosion is prevented and the supply of organic matter of the soil is maintained. On a dairy farm an excellent rotation is corn, followed by oats and peas cut for hay or soiling, then clover one year followed by potatoes. The potato crop may be followed by timothy and clover if desired. Such a rotation introduces two leguminous crops into the rotation which not only supplies a large amount of protein for stock food but keeps up the nitrogen and humus supply of the soil. Another good rotation, where little stock is kept, is potatoes, wheat and clover. Such rotations increase the productivity of the soil and make farming profitable and when supplemented by all available manure, the occasional use of lime and the judicious use of mineral fertilizers, they make it doubly so. With further reference to this matter, I quote from the Reconnaissance Soil Survey of Southwestern Pennsylvania.

"Contour plowing, a gradual deepening of the tilled surface, liming, and a marked increase of the humus content, whereby the soil becomes more spongy to as great a depth as is practicable, and thus can absorb much more of the rainfall instead of letting it run off, and a winter cover crop for all sloping fields at least, are the principal means for preventing erosion. But such treatment pays directly in money return not only in lessening erosion, but also by getting the land into a much better condition for growing crops. Hence, this method of preventing erosion is the same, as far as it goes, as that described for increasing crop production. On steep fields corn ground should have a winter cover crop, although this is now seldom done. Cowhorn turnips or rye will serve for this purpose, and the vetches should be given careful trial, as they have the additional advantage of being legumes."

In conclusion, I would emphasize the importance of keeping strict account of the cost of producing each crop. If the results do not warrant the expense of growing certain crops they should be dropped and others substituted. Good business methods are as applicable to farming as to any other business.

Our ultimate success as a nation will depend on our ability to secure a plentiful and cheap food supply. The public is interested in seeing enough succeed in farming to meet this requisite. Soil conservation lies at the foundation of such progress.

THE FIGHT AGAINST THE CHESTNUT TREE BLIGHT.¹

S. B. DETWILER,

EXECUTIVE OFFICER PENNSYLVANIA CHESTNUT TREE BLIGHT COMMISSION.

Although a determined effort to control and eradicate the chestnut bark disease was made by a number of public spirited citizens, residing in the vicinity of Philadelphia, it soon became evident that they were unable through individual efforts, to save their valuable chestnut from destruction. As a result, Pennsylvania took up the fight against this destructive tree disease in earnest, realizing the necessity for prompt and vigorous action on the part of the Commonwealth. A commission was appointed in June, 1911, for the purpose of thoroughly investigating the chestnut blight, to devise and apply ways and means through which it might, if possible, be stamped out.

In 1909, according to the report of the state auditor general, there were 7,633,180 acres of forest land in Pennsylvania, of which it is estimated that 21 per cent., or approximately one fifth, is chestnut timber. Allowing two poles, four ties, and two cords of wood per acre, and allowing \$2.00 per pole, 33 cents per tie, \$1.00 per cord for wood, the total value of the chestnut timber in Pennsylvania would be \$55,000,000, in round numbers. If we allow \$15,000,000 as the total value of the nut crop, and orchard, park and shade trees, the total value becomes \$70,000,000. This does not consider the value of chestnut forests as protection for watersheds. By dividing the counties in the eastern half of the state into zones, as shown on the map (Fig. 1), on the same basis as the above estimate is made, the value of the chestnut trees already killed or affected by blight in Pennsylvania is estimated at \$10,000,000. Of this amount \$7,000,000 is the value of poles, ties and other wood products, and \$3,000,000 is estimated as the value of orchard, park and shade trees, the loss to nurserymen and to real estate owners. It is believed that \$3,000,000 is a low estimate for the value of these trees, since the loss to real

¹This paper was presented at the interstate conference on Chestnut Blight, at Harrisburg, Pa., on February 21, 1912.

estate owners and to owners of shade and orchard trees has been particularly severe in the southeastern corner of the state where the chestnut tree is of great importance in this respect.

No reliable estimate of the annual income from the sale of chestnut products in Pennsylvania can be given. The statistics of the Forest Service, for the year 1909, show that for the United States the value of the annual cut in that year was approximately \$20,000,000. Of this amount, about one half was the value of lumber, lath and shingles, the other half representing the value of poles, ties and extract wood.

The Pennsylvania Chestnut Tree Blight Commission began its investigations in August, 1911. The general plan adopted by the commission is that recommended by Dr. Metcalf in his recent bulletin on the control of the chestnut bark disease. In brief, this consists in first determining the exact range of the disease, especially the advance points of the infection. The diseased trees of these spot infections are destroyed as soon as possible after being located. Ultimately, it is planned to establish a zone free from the disease which will be constantly patrolled for new infections. The portion of the state west of this zone will be thoroughly scouted over at least once each year and new spot infections eradicated as soon as found.

East of the immune zone no immediate attempt will be made to eradicate the disease, partly because most of the energy will be required to fight the disease in the immune zone and westward, and also because of the poor market for chestnut products, especially cordwood, of which a large amount will be produced. It is planned, however, to place competent men in the region of general infection for the purpose of encouraging timber owners to cut their diseased trees before they deteriorate, and to assist them in finding a market for this material. In communities east of the general advance line where the per cent. of blight is not high and the owners desire to coöperate in cutting out the diseased trees, the commission plans to give all possible encouragement and assistance.

The following is a résumé of the provisions of the Act which governs the work of the Pennsylvania commission.

Section 1. A commission consisting of five persons, to serve for three years, is created.

They are given power to use all practical means to destroy the chestnut tree blight.

The Department of Forestry is directed to work in collaboration.

Section 2. The commission and its agents or employees are given power to enter upon any property to determine whether trees are attacked by blight. They are directed to coöperate with owners for the removal of the trees and eradication of the disease. The commission will furnish every owner with information respecting the location of his blighted trees.

Section 3. If an owner refuses to coöperate with the commission in applying remedies or doing any act directed to be done to prevent further spread, the commission may give him twenty days' notice that it will proceed if he does not. At the end of the period of notice the commission may cause trees to be destroyed, and the cost of doing such work is collectible from the owner; and if the cost be not paid within sixty days, the commission is directed to proceed by action at law.

An owner may appeal from the decision of a member of the commission or any of its agents or employees, within ten days after receiving his notice. The commission will then direct a reëxamination and accord a hearing to the person making the appeal. Proceedings in the meanwhile will stay.

Section 4. The commission is given power to establish a quarantine or destroy trees not affected by blight, if so doing will result in preventing spread of the disease. Good trees so destroyed are to be paid for at current stumpage prices. In case an owner be dissatisfied with an amount allowed him for the destruction of good trees, he may appeal to a court for such remedy as he thinks he may be entitled to.

Section 5. Violations of this Act or any of the regulations adopted by the commission, or resistance to an officer of the commission, are declared to be a misdemeanor, and upon conviction may be fined \$100 or imprisoned one month; and the provisions of the Act are extended to corporations as to individuals.

Section 6. The commission shall receive no pay but actual expenses only. The employees of the commission are to receive such compensation as the commission may determine.

The superintendent of buildings and grounds shall furnish them with suitable offices.

\$25,000 is appropriated for scientific research and office expenses, and \$250,000 additional for general field work.

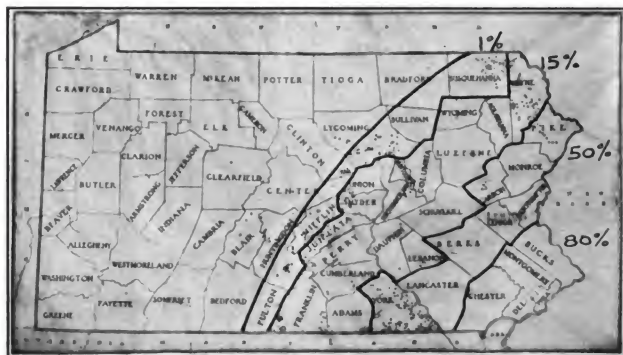


FIG. 1. MAP SHOWING EXTREME WESTERN POINTS OF INFECTION LOCATED BY THE FIELD AGENTS OF THE CHESTNUT TREE BLIGHT COMMISSION. The open circles show points of infection; the dark circles that the infected trees were removed in these places. The percent refers to the estimated amount of infection in the areas marked. (Map corrected to February 20, 1912.)



FIG. 2. TOTAL DESTRUCTION OF CHESTNUT FOREST BY THE CHESTNUT TREE BLIGHT.

Section 7. Repeals all inconsistent legislation.

A quarantine on the shipment of chestnut nursery stock was declared by the commission soon after its organization. Regulations were made requiring that all nursery stock prior to shipment be inspected by an agent of the commission and dipped for several minutes in an approved fungicide, preferably Bordeaux mixture, in the presence of an inspector. Nurserymen are prohibited from shipping, and transportation companies from carrying, chestnut stock not bearing the commission's tag. Chestnut nursery stock shipped into the state from without is to be held at the border of the state for inspection. The nurserymen and transportation companies of the state deserve credit for willingly coöperating with the commission to make this regulation effective.

A field force of over thirty men has been organized, and the extent of the blight in the state has been determined approximately. The infected region in Pennsylvania occupies the eastern two fifths of the state. The westernmost line of general advance may be shown by drawing a line from Susquehanna to Williamsport, and southward through Huntington to the southern boundary of the state, although there are scattered spot infections west of this to near the Ohio state-line in the southwestern corner of the state (Fig. 1). The field work done by the commission last summer and fall was largely scouting, to locate the extent of the disease. From January 15 to February 15, 1912, 1,352 infected trees on 87 tracts have been disposed of according to the regulations of the commission, and fully as many more are in the process of removal. During the summer months, when the work is carried on to the best advantage, it is planned to increase the field force so that the state may be thoroughly scouted and all diseased trees cut out west of the advance line.

On the advance line and to the westward, the owner of the trees marked for removal is required to burn the bark from visibly diseased or cankerous portions of the trees. He is also required to destroy the bark of the stumps of infected trees, either by peeling the bark to the ground line and burning it, or by burning the brush over the stump until the bark is consumed. Experiments are being tried to determine if it is not practical to cover the stump with kerosene, crude petroleum, tar, or some similar material, to make the destruction of the bark thorough and less expensive. A trial shows

that one man at this season of the year can peel six stumps 10" to 15" in diameter in an hour.

It is the policy of the commission to use every possible means of securing the coöperation of owners in cutting infected timber, before resorting to their power under the law. The authority that the law gives the commission is sufficient to insure respect for its powers, but we realize that the law alone is not sufficient to make our plan of controlling this disease effective unless it is backed by strong public sentiment in its favor. This is being accomplished by educating the public to recognize the symptoms of the disease and to realize its serious character through lectures, field meetings, circulars, newspaper articles, and other work of an educational nature, such as interesting school children and boy scouts in the movement. So far, no serious opposition has been met with in the work of eradication; on the contrary, we have had exceptional coöperation from all classes of timber owners.

The commission maintains a laboratory for determining doubtful infections, and for conducting experiments in the control of the disease through the use of sprays, fertilizers, and medications. The commission is giving an impartial trial to the many remedies submitted, to determine their effectiveness. These experiments are being pushed forward as rapidly as may be done, but no remedy will be endorsed by the commission until its efficiency has been demonstrated beyond all doubt. Most of those submitting remedies for the blight have in mind the size of our appropriation rather than the practicability and efficiency of their remedies to the public.

The commission keenly realizes its responsibility to the public for the proper expenditure of the funds placed at its disposal. The proceedings of the Harrisburg conference emphasized the great need for comprehensive scientific investigation into all phases of the blight problem. It is only by finding out all the facts relative to the disease that we can hope to eradicate it, and it is evident that many scientific facts of practical importance are still unknown. For instance, it has not yet been definitely determined what agents are of primary importance in distributing the spores, nor to what extent the disease may be spread by the transportation of barked and unbarked products of diseased trees; two points which have a direct bearing on cost and efficiency of control. The woodpecker and other birds have been blamed for spreading the blight, when

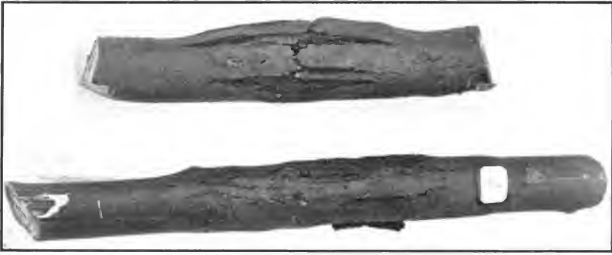


FIG. 3. INFECTED BRANCHES SHOWING THE SWELLING AND SHREDDING OF THE BARK. The reddish pustules or fruiting bodies appear as black dots.



FIG. 4. BEETLE LARVÆ IN INFECTED TISSUE. Whether these beetles disseminate the spores to any great extent is undetermined.

in my opinion it is more apt to be the fault of insects. Further investigations may prove this to be as much a problem for the entomologist as for the pathologist. We feel a sentimental interest in the birds. Nevertheless, this does not free us from also investigating them to find out scientifically their exact relation to the spread of this disease. In other words, we must investigate everything, whether we believe one thing or another. At the present time three field agents have been detailed to make special studies of field conditions for the purpose of securing further facts relative to several of these problems. Many lines of coöperative investigation and experiment are in progress and others are planned. Detailed knowledge of the agents causing infection and the time of year when infection occurs, which will be obtained as the work progresses, will undoubtedly assist in making control more effective and in cheapening the cost of the work of eradication, by pointing out the simplest methods required to give satisfactory results. In the meantime, however, it is our belief that sanitation is practical and should give good results in checking the spread of this disease, as it has done in the case of other diseases. Quarantine measures proved successful in checking outbreaks of yellow fever *after the mosquito was convicted*. It is more than probable that by destroying the diseased bark of infected trees in the eastern half of the state, we shall also destroy the agency which spreads the disease.

In my opinion, the big problem which confronts us and which more than any other will determine the success or failure of our undertaking, is the question of profitable utilization. A satisfactory market for the various classes of chestnut wood which must be disposed of as a result of the cutting-out method of control appears to me to be vital to the ultimate success of the plan. The active coöperation of chestnut owners cannot be willingly secured if they must do the cutting at a loss. We have found that owners who were reluctant to cut have been willing to do so after they found a market for the product which enabled them to follow our regulations without expense, or perhaps at a profit. The commission, by acting as a clearing house to bring buyer and seller together, will be able to assist materially in solving this problem. There are over thirty uses of chestnut wood, and it seems likely that all the chestnut wood which will be produced can be utilized, provided it can be delivered to factories and other concerns at a price which

will allow it to compete with other woods. The solution of this problem seems to lie in lower freight rates on chestnut products. All classes of chestnut products will probably become more or less of a glut on the market, unless rates can be secured which will enable such material to find a market over a much wider territory than at the present. The greatest present difficulty, however, lies in the disposal of chestnut cordwood.

Pennsylvania's program may be summed up as doing all that can be done along the lines indicated to save the chestnut trees. If successful, we shall be most happy; if we fail, after an honest fight, we shall have the satisfaction of knowing that it has been money wisely spent. Even though we accomplish no more than to secure the best utilization of the blight-killed material, the expenditure of money and effort is justified; and in addition we have the educational value along forestry, conservation and pathological lines; an invaluable object lesson to the state and nation, of which fact we must not lose sight.

Pennsylvania hopes for two great results: First, the united effort of all the states where the chestnut tree grows in attempting the control of the chestnut blight, and second, assistance from users of chestnut products in devising ways and means of profitably disposing of the products of diseased trees. The other thing needful to ultimate success, that is, the complete scientific facts of the disease, will be obtained in the course of time through systematic investigation.

SOME POINTS IN PENNSYLVANIA FORESTRY.

J. T. ROTHROCK,

STATE FORESTRY COMMISSION.

Forestry is the first division of the great conservation problem to which marked attention was directed in a systematic manner. No doubt its exploitation paved a way for the universal interest felt in the larger problem of which it is a part. Forestry has, in most instances, been the leaven in the conservation mass.

This leads us to ask what is now the actual condition in forestry matters in Pennsylvania. It is beyond doubt true that this state has, from the start a quarter of a century ago, been a pioneer in the forestry movement, and we may add, it has been most successful in the conduct of its propaganda. For nineteen years it has been kindly dealt with by our legislature. As a result the actual work thus far accomplished may be summed up thus: A state department of forestry coördinate in rank with the department of public instruction, or public health; a state forest reserve of a million acres; two up-to-date forest schools (one of which is wholly under direction of the State Forestry Commission and the other is a division of the State College); three nurseries for the production of forest tree seedlings; an annual planting out of several million young forest trees; a constantly decreasing list of forest fires; and lastly a healthy condition of public sentiment which is steadily maturing in favor of increased activity in all that pertains to conservative use of, and care of, our remaining forest resources.

In addition, but distinct from the above, is an existing law by which municipalities may possess and manage forest areas and utilize them for purposes of recreation, timber culture, water supply or any other public interest. There is now a lively demand for state ownership of extensive forest park areas, which shall be dedicated to the outdoor life of our people rather than to any directly commercial purpose. For this existing law and for the sentiment in favor of a great forest park, as an outing ground for the people, we are largely indebted to the president of the American Civic

Association and to others associated with him in general conservation problems.

Forestry having become an important function of the state government, and having grown from an unimportant to a commanding position in the public eye, has thereby attracted attention in the political mind. Time was when it had in hand no offices to grant and was allowed to do its work in peaceful obscurity. It has grown out of this and there are indications that it is to be regarded as a portion of our political system, to be officered and served in accord with machine rule. Against this we protest. Forestry is a profession—as different from the business of the lumberman as construction work is from destruction work. A man's fitness to serve the state faithfully and successfully in the forest service has no more relation to his political usefulness than that of a teacher has, and there are no more reasons why forestry should be prostituted to politics than there are why education should be so degraded. The man who demands the right to place his political adherents into paid positions in forestry as the price of his vote in the legislature, is just as much guilty of taking a bribe as if he had accepted money for the same service. It is to be hoped that no circumstances will place Pennsylvania forestry into a pool of political degradation. We must admire the fearless candor of former Governor William A. Stone, who asserted there "was no politics in forestry" and made no secret of his statement.

In an official forestry position, requiring special training or special skill, no man should be appointed, or rejected, because of his political relations. Of course the above sentence is a platitude, not likely to be considered; but it is, nevertheless, worth stating as clearly as possible.

Pennsylvania and New York enjoy a preëminence over the other states in the fact that they have bought and paid for the land they have reserved for forest purposes, though in the case of the latter state, the Adirondack purchase was made to provide an outing ground for the people, rather than with any reference to a future timber supply.

It is not necessary to inquire into the causes which led other states to decline to do the same. It is, however, pertinent to say that the liberality with which some that have bought no land are

proposing to place the lands bought, paid for and owned by New York and Pennsylvania under federal control in the great Appalachian reservation, is as refreshing as it is characteristic.

The attitude, too, of the thirteen original states to the other states merits just a moment's consideration, for every acre of the newer states was acquired by the federal government by purchase or conquest, at the cost of the states already in the union. We might almost say that "body and soul" they belonged to the Union.

The original thirteen were, when their boundaries were settled, each doing business in their own name. Whatever federation or community of authority existed was of the lowest possible sort. Even under the more binding constitution, only certain powers were ceded to the general government.

The object in calling attention to these growing problems at the points of contact between state and federal authority is not so much to interpose objection as it is to suggest a strict adherence to the literal terms of the constitution of the United States, rather than the adoption of any forced interpretation to meet alleged demands of the time. Violation of the spirit of the constitution by the courts is much more harmful than its violation by the common criminal, for it shatters the foundation upon which our hopes rest. The federal constitution provides methods by which its shortcomings may be rectified, and it was, no doubt, this fact which led Mr. Taft to say that though the constitution was under trial, he thought it would prove to be sufficient. Obviously it is wiser to amend than to violate it.

Was the power ever "delegated to the United States by the constitution" to take possession at will, in time of peace, of any of the territory of any state, or was the power to retain what a state had acquired by purchase ever "prohibited by the [United States] constitution to the states"? (See Article Ten of the Constitution of the United States.) There is much that might be said upon this aspect of Pennsylvania forestry, for it is evident we are approaching the danger line of encroachment.

On May 11, 1911, Governor Tener approved an Act "Empowering the United States of America to acquire land in the state of Pennsylvania for national forest reserve, by purchase or by condemnation proceedings; and granting to the United States of Amer-

ica all rights necessary for control and regulation of such reserves. . . . Provided, that the approval of the State Forestry Reservation Commission and the Water Supply Commission shall be first had and obtained; and Provided further, that if at any time in the future, after the establishment by the federal government of such national forest reserves, in the commonwealth of Pennsylvania, the commonwealth shall desire to resume complete ownership and control over said lands, it may do so by appropriate legislative action, providing therein for the repayment to the United States of America of all moneys which may have been spent in acquiring lands, the ownership of which is to be resumed, and interest thereon at the rate of two per centum per annum."

With this law no fault is likely to be found by any of our citizens. It maintains the dignity and sovereignty of the Commonwealth, and will furnish to the General Government an opportunity to acquire amicably all of our area that the good of the country requires.

PROTECTION OF FOREST LANDS IN PENNSYLVANIA.

MIRA LLOYD DOCK,

STATE FORESTRY RESERVATION COMMISSION.

At present there are three means of protection from fire in Pennsylvania:

First. A small permanent force of foresters and rangers, whose duty is primarily to the State holdings, but who are also required to use all means in their power to protect adjacent private lands.

Second. A system of fire-wardens established in 1909 for the State at large, with an appropriation of \$50,000 to cover expenses incurred in performance of duties. All State appropriations are for periods of two years.

Third. Voluntary associations of private citizens who have become incorporated for the express purpose of protecting certain tracts from fire and other disasters.

It is quite impossible to realize the responsibility of these several protective forces without a clear understanding of the extent and location of their several fields of activity and it cannot be too clearly stated that there never will be actual and constant prevention of forest fires in any part of our country unless there is an adequate permanent force provided.

The total acreage of Pennsylvania is 28,855,040 acres, and the total acreage of forest reserves is 970,000 acres. The State holdings form only about one twenty-ninth the total area of the State. There should be not less than one seventh in forest if protection is to be adequately provided.

Location and Topography of Forest Reserves.—The lands so far acquired by the Commonwealth of Pennsylvania for forest reserves are located in twenty-six counties, and comprise every variety of topography and every natural feature to be found in the State, excepting lakes. The broken plateaus of the northeast, broken highlands of the southern border, the parallel ridges and outlying spurs of the Juniata region, and the vast mountain masses, steep ridges and foothills, and canyon-like gorges of the northern counties, each

district offers problems of its own, but all have one common danger—fire.

The most easterly of the reserves are located in Pike and Monroe counties, the most westerly in Somerset and Westmoreland, but by far the larger number extend over the central mountain regions of the State from the New York border to the Maryland line. Of this inner, more centralized group, the most eastern reserve lies in Dauphin County, the most southern in Franklin and Bedford, the most northern in Potter and Tioga, and the most western on Elk-Clearfield tract.

Character of Tracts Acquired.—The lands acquired may be grouped in three main classes:

A. Large tracts formerly owned and controlled by lumber companies who sold the lands after they had been lumbered. These tracts lie chiefly in the northern and central parts of the State and present the most spectacular contrasts of scenery and conditions to be found in the State. Everything in the northern counties is very positive; the summit plateaus are very extensive, the ravines very deep and steep, the streams are so swift that in their upper reaches they form cascades of great beauty which are well worth a journey to see.

B. Old charcoal-iron furnace properties which had ceased to be profitable and which as a rule have more and better timber upon them than any other class of lands; upon some of them are fine old buildings, and all have locations of great natural beauty; these are chiefly located in the central and southern portions of the State.

C. Tracts chiefly interior to or adjoining the other two classes; upon several of these are woodlands of value.

Historic Sites.—Upon several of the reserves are points of historic interest, as the little stone chapel at Mont Alto, which was the first charge of the late Bishop Potter of New York. On the Mont Alto highlands Dr. Rothrock established in 1901 the State Sanatorium for Tuberculosis patients, which on the establishment of the Department of Health in 1905 was transferred to its care. Its subsequent development under Dr. Dixon is well known.

Adjoining Mont Alto on the north lies Caledonia Reserve, where Thaddeus Stevens in 1837 founded the Caledonia furnace, named by him after his native county in Vermont. There is now a most beautiful recreation park on the site of the old furnace, rolling-mills



Road through Hemlock Forest on Lyman Run near Gateton, Potter Co.



On Pine Creek, near Cammal, Lycoming County.

and forges, and the former race-banks are now hung with rhododendron, the glory of these beautiful South Mountain woods.

Through the Caledonia lands runs the Chambersburg and Gettysburg pike, along which Lee's army marched to its doom at Gettysburg nearly fifty years ago.

On the North Mountain, Franklin County, the birthplace of James Buchanan has been transferred to the care of the Forestry Department.

In Potter County, on a bold promontory overhanging Kettle Creek, of prosaic name and extreme beauty, are traces of a musician's dream, the remains of the terrace-wall surrounding the "Castle" built by Ole Bull, when, in 1852, he established his Norwegian colony in these then forest-clad hills.

Pennsylvania Foresters' Service.—When the forest reserves were first established there was not a trained forester in Pennsylvania, nor was there any school in the State where training in practical forestry was given. It has been the constant aim of the Forestry Department to develop a trained and efficient permanent service, and the Forest Academy at Mont Alto, which has grown from one forester and two student assistants in 1902, is a concrete evidence of that aim. Ten young men annually are admitted to a three-year course after passing a competitive examination; only actual residents of Pennsylvania are eligible for admission.

After graduation the foresters are assigned by the commissioner of forestry to field work on the reserves, or to other duty. The loyalty and efficiency of the men of the State forest service is being more and more appreciated and valued, as is shown by the numerous calls for advice, for practical demonstrations in the care of trees and woodland, for addresses in schools, and other forms of service, and each forester's headquarters is growing to be a local bureau of information.

Pennsylvania Ranger Service.—The rangers are always appointed in the localities where they live, and some have special duties incident to their district. The main body of rangers are under direction of the forester of their reserve, and their duties vary according to season, locality and conditions, but during the fire season their sole duty as a rule is to patrol their "range," or if fire breaks out to fight fire.

In addition to the rangers, there are on some reserves one to

several laborers permanently employed in nurseries, on roads, etc., and they form a very important part of the fire crews, since, like the rangers, they are native mountaineers, who know every road and trail.

In the Fire Season.—The fire seasons last from March through May, and from early in September to about the first snow-fall, according to weather. During these danger periods the rangers patrol daily, spending most of their time on their "lookouts," either natural ledges of rock, or structures erected on the highest point of their range, from which they can see the first faint lines of smoke that indicate fire. Of course, when any one fire has burned long enough to cover any district with smoke it is impossible to observe any new outbreak. If fire is discovered from an outlook, the ranger at once gets word to reserve headquarters, or to the nearest point where help can be obtained, and the actual "fighting" begins.

The Caledonia Reserve may be taken as a typical example of the problems on the State reserves. This tract comprises about one half of the South Mountain reserve of upwards of 60,000 acres, is in charge of a resident forester, and has four rangers, and eight laborers as a regular force. It lies near to a large population, is traversed by a popular automobile route, has a largely patronized recreation park on its western border, which is reached by hourly trolley service. Through the fire season Sunday is an arduous day for the ranger on duty, as the first act of a townsman when reaching the country on a bright spring or autumn day is to light a cigarette and lightly toss the match as far as possible.

Fire-fighting.—When an alarm is given the forester as a rule takes charge of the crew, who at Caledonia are accustomed to "team-work," certain duties always falling to the same man. Two are axe-men, two rakers, one carries the torch for back-firing, and one ranger is always detailed for the "after-patrol," travelling along the burned tract from a half mile or more to the rear of the working crew, to make sure that all fire is safely extinguished. The head ranger remains as a home-guard near the telephone, except when he is driving out to the crew with food, or looking after any duty that falls his way.

Old and New Systems.—Before the Pennsylvania Forest Service was organized, fire fighting was carried on under an old act, which made all constables of townships ex-officio fire-wardens of their



OLD STYLE LUMBERING. Waiting for a Freshet, First Fork of Sinnemahoning, Cameron Co.
Note the deforested slopes. Photo by A. A. Bennett & Clarke, Hulls, Potter Co.



MODERN LOG LOADER AND TRAIN, EAST FORK, POTTER CO.

district. A concrete instance will show the efficiency of the present over the old system, in the same district.

In April, 1902, a fire was driven by a west wind eastward over the crest of Rocky Mt. in Greene Township, Franklin County. The constable of that township summoned a large force, who made every effort to control it, but fire knows no county or township line, and before the constable of Franklin Township, Adams County, could arrive with his men and back-fire, a hard wind blew the flames into Adams County, where the fire wandered and crept, and flamed high at times for four days, and every property owner at some time back-fired his neighbors' land.

In May, 1911, an incendiary fire was observed at eleven o'clock on Saturday night in the same district in Adams County that had suffered in 1902. All artificial lines are abolished by the Fire Act of 1909, and by twelve o'clock the head ranger, who lived in Adams County, had his fire crew, who lived in Franklin County, on the hill. By four o'clock Sunday morning the fire was subdued. Four hours work, where formerly four days had been unavailing.

But there are conditions when the most efficient force is helpless in the face of a high and cyclonic wind. Last October I passed over a road where at a point in a ravine, between the road above and stream below, the crew of fourteen men, who had apparently conquered up-running fire, formed a bucket brigade at a burning stub. The ravine side was so steep that the top-man dropped his bucket to the lowest man, and victory seemed sure, when a fearful swirl, and flames darted out to be tossed upward against the dry grasses and dead slashings above the road, and for two days a conflagration raged, sometimes on one side of the deep gulches of that region, sometimes hurled across to the other side. When the wind raised the flames at the stub, three men patrolling a back-fired tract at a distance on the same reserve were caught by the same gale. One escaped to the unburned land with difficulty, one got back to the burned area where everything had literally been burned to the bone, and the third dropped down a ravine, where, with a bucket over his head, he travelled for half a mile down the rocky bed of the stream through flame and smoke to safety.

Fire-wardens.—Under the provisions of the present Fire-warden's Act, there have been appointed 1,140 fire-wardens, and 133 assistant fire-wardens, which, with the permanent force of the State

Forestry Service of 136, makes a total of 1,409 persons supposedly concerned with fire protection.

But, as in Maine in 1911, and in all the great "fire" States, this act, so admirable in design, fails in execution because of insufficiency of appropriation to meet emergencies.

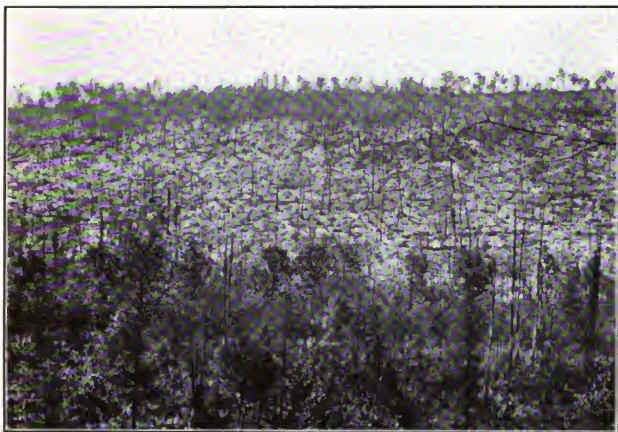
In 1909 the legislative appropriation was \$50,000 to cover expenses that might be incurred. The actual expenses from June, 1909, to June, 1911, were \$80,976.88, a deficit of more than \$30,000, which had to be met by an appropriation by the legislature of 1911 to pay for services truly rendered.

The appropriation for the period June, 1911, to 1913, is also for \$50,000. Time alone will show whether this amount is sufficient to cover expenses incurred in fire suppression, but the facts cited show that the most advanced section of the act, section 18, which *permits* patrolling during the fire season, is inoperative because of insufficiency of funds, so as an actuality, instead of a force of more than 1,400 men actively engaged in protective work, the really active permanent force is less than 200.

I am inclined to believe that provision for a regular patrol service will within a few years at most be a regular appropriation, as soon as the benefit of a permanent force is realized.

Future Steps in Fire Prevention.—The ideal means of fire prevention is coöperation between State service and organized associations. No State service, unless of extraordinary numbers, can prevent or suppress all classes of fires, and the most hopeful feature of the present widespread agitation for fire prevention is the formation of citizens and timber owners associations in our country, in which as a rule assessments are based on acreage or timber values.

As usual in all forestal matters, Pennsylvanians were among the first to organize these citizens' associations, one of the earliest being the "Pocono Protective Fire Association," which was incorporated November, 1902. This association "has for its purpose the protection of the lands of the members thereof, and all the wood and timber lands situated in what is known as the Pocono region, in the county of Monroe, by preventing the introduction and controlling the spread of forest fires thereon." The expenses of the association are met by assessments levied upon the members, and the rate is based upon the valuation of the properties held by them, as determined by the township assessors.



SHRINER'S MOUNTAIN, UNION COUNTY, RESULT OF FIRE IN 1909. Note green saplings in foreground, as contrasted with burned land.



PINE STUMP ON SHRINER'S MOUNTAIN, UNION COUNTY. Showing Depth to which Humus and Soil Burned, Uncovering Roots and Stones.

Another society is "The Eagles Mere Forest Association," which was organized July, 1906. This organization aims "to preserve, by purchase or by any legitimate arrangement, portions of the primeval forest contiguous to the borough of Eagles Mere, Sullivan County, Pennsylvania, and to favor a State forest reserve in the same vicinity. This preservation is for scientific and sanitary purposes only, and not for any purpose of financial profit to its members." This society has a resident forester who takes charge of all fire fighting in his neighborhood.

Roads and Fire Lines.—The first necessity in fire prevention is a road-system which will permit access to all main points of any tract in the shortest possible time, and the Pennsylvania Department of Forestry has been for years developing such a system, based upon the principle of forest road work, viz.:—main lines upon the long axes of tracts, and lateral lines up ravines and hollows, connecting the main lines of the high and low elevations. This system has not and cannot be thoroughly worked out for years, but many hundred miles of both new and old roads have already been opened and have proved of great service; indeed there can be no protection without a good road system.

All of the State holdings are crossed, some of them in several directions, by turnpikes, and township roads, some of the latter in good repair, some of them quite the reverse, but neither of these are under management of the Forestry Department. Upon the State holdings there are two classes of roads of great importance which are solely under control of the State Service, viz.:—A—"old coal roads" upon the former furnace tracts. B—Abandoned railroads on the great lumber tracts. The former were woodroads that radiated outward from the furnaces, and penetrated to the charcoal hearths dotted through the woodlands, which were sometimes very extensive, ranging from 10,000 to 30,000 acres in size, and frequently covering several mountain ridges. These re-opened roads afford most interesting and delightful scenery in addition to their primary purpose.

The abandoned lumber railroads afford the beginning of an almost perfect road system, running as they do, sometimes for a total of fifty miles and more, from the lowest level of a great tract to the summit highlands, once covered with the most superb timber of the eastern forests. After the companies had "cleared" the

tracts the rails were removed, the ties left to decay, and in most cases have to be grubbed out and the roadbed well dragged before vehicles can pass over with any degree of comfort, but after the road-bed has been dragged and driven over for some little time it far surpasses the ordinary dirt road, because of its easy grade.

In addition to the road system the department is developing a system of fire lines which will ultimately define portions of Reserves, and connect road systems.



SLATE RUN R. R. (BEFORE CUTTING.) This road was more than forty miles in length. Everything has been cut, the rails removed, ties for half its length have been taken up and the road-bed dragged, making an ideal mountain road and fire-line.



THE SAME REGION AFTER REMOVAL OF TIMBER AND FOREST FIRE. On a bank like this a crew of fourteen formed a bucket brigade. The bank is so steep that the top man dropped his bucket to the lowest at the creek.

ANNUAL DINNER OF THE SOCIETY.

The Geographical Society, at its annual dinner in the Clover Room of the Bellevue-Stratford Tuesday evening, March 26, received first-hand advices upon the unrest and progress of India, China and Persia and the comparative tasks of discovering the North and the South Poles.

On the latter subject, Rear Admiral Peary, discoverer of the North Pole, spoke about Amundsen's feat and compared it with his trip in the Arctic polar regions. On the unrest in India, Rustom Rustomjee, of Bombay, a Parsee member of the Indian National Congress, spoke. W. Morgan Shuster held forth concerning Persia. V. K. Wellington Koo, of Columbia University and editor of the Chinese National Union, delivered a graphic recital of the facts leading up to the Chinese revolution and painted a rosy prophecy for the future of his people. A countrywoman of Mr. Koo's, Miss Grace Chu, of Cushing Academy, Ashburnham, Mass., talked on the life and customs of the middle-class Chinese women.

It was a cosmopolitan affair. Professor Emory R. Johnson presided and first introduced Mayor Blankenburg, who spoke very briefly.

Rear Admiral Peary's toast was "The Conquest of the South Pole." He delivered a sincere tribute to the late Rear Admiral Melville, who was a member of the Geographical Society and Peary's chief champion when the discovery controversy was raging two years ago. That Admiral Melville should live to see both Poles discovered, he said, was one of those kindnesses that providence bestows upon the deserving.

Admiral Peary made an analytical speech about the two Poles and their discovery. He declared that he had no doubt but that in the course of a few weeks—or maybe in shorter time—we would hear from Captain Scott. And in his opinion we will receive the news that Scott, too, had reached his goal by another route from that which Amundsen took. Then, he declared, there will arise the dispute of precedence. But, in Admiral Peary's estimation, the ques-

tion of who reached the South Pole first would be overshadowed by the fact that both explorers got there.

He concluded by paying a warm tribute to the Eskimo dog, which he characterized as the prime factor in the discovery of both poles.

Mr. Rustomjee divided the unrest that existed in India into two classes, loyal and disloyal. Economical causes are responsible, he declared, and the unrest is almost entirely obliterated now, and peace and prosperity are to be found in India. He paid a tribute to Lord Morley, who as Secretary of State in India settled many perplexing problems and introduced many wise reforms.

Mr. Koo was most optimistic about the future of the new Chinese Republic. He said that the new government is experiencing the hardships which encountered the American government after England was compelled to withdraw from our shores.

He said that China did not need organizers. She has men who can organize and administer the new government's affairs. But he said that China did need the sympathy, indulgence and the good will of the United States. He said that already China owed a debt of gratitude to the American nation because the training that the young men of China received here in the American colleges is being put to wonderful use.

Mr. Shuster replied to the toast "The Recent Changes in Persia," and gave an elaborate description of the Machiavelian parts taken to absorb the sovereignty of that government by Great Britain and Russia. He asserted that the division of Persia was brought about by an agreement between the two nations with the intention on England's part of having a strong ally on the north of Germany, as she already had on the south, and he told how this had worked out to the advantage of Russia.

Mr. Shuster drew an awful picture of the results of British perfidy to Persia whose integrity she was supposed to insure. He declared that Englishmen, when they learned the truth, had been ashamed of the attitude of their government, and went so far as to declare that by its stand Great Britain had lost something of its prestige and had estranged the loyalty of 73,000,000 Mohammedans in India.

He asserted that it was a mistake to believe that the British government had solved the India problem. The fear of Pan-Islamism,

he continued, had not been diminished by the events of the year 1911 in Persia.

His allusion to the loss of the loyalty of the Mohammedans in British India drew forth a rejoinder from Rustom Rustomjee, who already had spoken, but asked leave to make an answer to Mr. Shuster's assertions. These, he declared, were mistaken. He said that of the 73,000,000 Mohammedans in India only about 10 per cent. were pure Mohammedans, the remainder being half Hindu. The majority of these millions, he said, cared little for what was happening in Persia, and that the 10 per cent. he could not believe would swerve from their loyalty and devotion to the British sovereign.

MINUTE ON THE DEATH OF ADMIRAL MELVILLE.

SUBMITTED BY HENRY G. BRYANT.

In the death of Rear Admiral George W. Melville this society is conscious of the loss of one of its most distinguished honorary members whose wise council and ripe experience were ever at our service and whose enthusiasm in the cause of Arctic exploration and scientific research was always an inspiration not only to his comrades in the field; but in later years to the explorers of a younger generation.

Mindful of the fact that the present is not an appropriate occasion to review the conspicuous career of our subject, as an Arctic explorer and as one of the moving forces in the creation of our modern navy, we desire nevertheless to place on record our special feeling of obligation to our late member in his relations to this society.

In 1894 the Peary Auxiliary Expedition was sent north in charge of an officer of this society and under its auspices. Admiral Melville served as a member of the advisory committee which arranged important details and issued a letter of instructions to the commander, which covered many of the contingencies of an Arctic voyage.

The drift cask experiment, undertaken by this society to secure data relating to the speed and direction of north polar currents, was due primarily to the initiative of Admiral Melville, whose long drift on the "Jeanette" convinced him of the feasibility of this method of obtaining knowledge of Arctic currents without endangering human life.

Finally, in the last months of his life, he demonstrated his interest in our society by presenting to it a number of relics relating to the Jeanette Expedition. These have now found a home in the exhibition cabinet in our library and, under his will there is a possibility of this collection being further enriched by receiving additional souvenirs of his Arctic service.

While grateful for these material and manifest expressions of his sympathy, the officers of this society will likewise cherish the memory of the disinterested friendship, the clear judgment and devotion to high ideals of duty which marked him as an accomplished naval officer and as a high type of American manhood.

GEOGRAPHIC NEWS AND NOTES

YALE EXPEDITION TO PERU.—The results of the recent Yale Expedition to Peru are summarized in a recent report by the Director to the Yale Corporation.

The Yale Peruvian Expedition consisted of seven men including Professor Hiram Bingham, director, Professor I. Bowman, geologist-geographer, Professor H. W. Foote, collector-naturalist, Dr. Wm. G. Erving, surgeon, Mr. Kai Hendriksen, topographer, Mr. H. L. Tucker, engineer, and Mr. P. B. Lanius, assistant. They landed at Mollendo, the chief seaport of southern Peru, in June, 1911, and went at once to Cuzco, the old Inca capital.

The first field of operations was the Urubamba River and its affluents including the hitherto unknown Rio Pampaconas. The second was a cross-section from the head of canoe navigation on the Urubamba south over the Andes to the Pacific Ocean. The third was the neighborhood of Mount Coropuna and Lake Parinacochas. For this last Arequipa was used as a base. The field work occupied five months. The expedition was divided into three parties to do archæological, geological and topographical exploration.

The Peruvian government, acting on the initiative of President Leguía, gave the expedition free entry for all their supplies and loaned the services of several soldiers and non-commissioned officers. Through the courtesy of President Taft, the United States Coast and Geodetic Survey and the Geological Survey loaned the necessary topographical instruments, and the Army, a complete medical equipment, including typhoid vaccine.

Sixteen topographic maps of the region traversed were made by Mr. Kai Hendriksen. He also took observations for latitude and longitude, particularly in the valley of the newly discovered Pampaconas River, about 80 miles long. A bathymetric and topographic survey was made of Lake Parinacochas, 11,500 feet above the sea. It is 17 miles long and six miles wide. Its greatest depth was found to be less than six feet. Ruins of a primitive civilization were found on its banks.

Mount Coropuna was successfully climbed by Professor Bingham and Mr. H. L. Tucker, and later was triangulated by Mr. Hendriksen. Its altitude was found to be, not 22,799 feet as given in the most recent maps, but 21,703 feet.

A geological map was made by Professor Bowman, across the Cordillera from the junction of the Urubamba and Timpia Rivers, southward along the 73d meridian to Camana on the coast, determining a number of important geographical questions hitherto unsettled. A topographical sketch map was made of the lower Urubamba valley from Roaslina to Pongo de mainique, a distance of about 100 miles. The limits of past glaciation and the present level of perpetual snow were determined. Various cycles of topographic

development were identified. Clear geologic evidences of past climatic changes were found, especially in the deep valleys of the Cordillera and in the deserts of the coast region. Devonian, Carboniferous, Cretaceous and Tertiary fossils were collected. Evidence was also found tending to show that the great coast terraces have had, not a simple geologic history as had been supposed, but a complex history including a submergence in the Tertiary period and a stripping which is still in progress.

Approximately 3,000 specimens of insects and non-flowering plants, besides several hundred land shells, were collected by Professor Foote at altitudes varying from 300 feet to 12,000 feet, in the valley of the Urubamba and its affluents. Little or no collecting has been done before in the districts visited and it is believed that the collections will add materially to our knowledge of geographical distribution.

Among the more important archaeological discoveries made by Professor Bingham are the ruins of a number of Inca or Pre-Inca cities, including:

1. Macchu Pichu, a city probably built by the "megalithic race" who preceded the Incas. The ruins are on an almost inaccessible ridge 2,000 feet above the Urubamba River. They are of great beauty and magnificence and include palaces, baths, temples and about 150 houses. Carefully cut blocks of white granite, some of them twelve feet long, were used in the construction of the walls. A map of the city was made by Messrs. Tucker and Lanius.

2. The temples of Yuracrumiu, the center of the Inca religious cult after the fall of Cuzco, containing a carved monolith 185 feet in circumference.

3. Vitcos, the palace and capital of Manco Capac, the last Inca, probably built after his retreat from before Pizarro's conquering army.

4. Vilcapampa, a purely Inca town now completely buried in the dense jungle of the Rio Pampaconas but containing characteristic Inca pottery, and bronze implements.

5. A number of other primitive towns in the coastal desert provinces, two of which were marked by volcanic boulders covered with pictographs including drawings of jaguars, llamas and dancing men.

Human bones were found by Professor Bingham, near Cuzco, embedded under 75 feet of gravel, interstratified with the gravel beds, and with the bones of several lower animals. They were later excavated by him and Professor Bowman in the presence of Professor Foote who photographed the bones in position. Professor Bowman made a detailed study of the geology of the surrounding region and concludes in his preliminary report that "the gravel beds belong to the Pleistocene series and that the bones were deposited during a period of pronounced alluviation." He adds: "It should be remembered that while compelled to refer the gravel beds of this locality to the Pleistocene series I have yet to determine their place in that series. When this is done the antiquity of the vertebrate remains may be more safely approximated than now. A provisional estimate would hardly be less than 10,000 years; it could not exceed the maximum glaciation of the last glacial period, generally estimated at 75,000

years." Dr. Geo. F. Eaton, curator of osteology in the Peabody Museum, to whom the bones have been submitted for identification, finds that there are fragments of eight bones belonging to at least three human individuals, one of whom "we may reasonably suppose to have been a remarkably thick-set and powerful man about five feet four inches in height." Among the other fragments are four bones of the *guanaco*, the ancestor of the llama, a leg bone of a wolf or wolf-like dog, and three bones of a bovine. The specific identification of this last species, says Dr. Eaton, "must rest largely on the geological evidence of its age, but there is no doubt that it is either the bison, *Bos americanus*, or a very closely related species." The evidence points to the possibility of the remains being of glacial or interglacial time. The bones will be deposited in the Peabody Museum at Yale.

ASSOCIATION OF AMERICAN GEOGRAPHERS.—The eighth annual meeting of the Association was held in Washington, December, 28-30, 1911. Through the kindness of the National Geographic Society, the sessions were held in Hubbard Memorial Hall and luncheon was provided for those in attendance.

The president, Professor Ralph S. Tarr of Cornell University, presided, and gave the president's address. His subject was, "The Glaciers and Glaciation of Alaska." Professor Martin read a memorial of Professor Christopher Webber Hall, who died on May 10, 1911. In addition to these addresses, thirty-six papers were read by members and by several others on invitation. Papers on subjects in meteorology were more numerous than at any previous meeting of the association.

On Friday evening the association met with the Geological Society of America to hear the address of its president, Professor W. M. Davis, upon the subject, "The Relations of Geology and Geography." This was followed by a smoker given to both societies at the Cosmos Club by the Geological Society of Washington.

The first volume of the *Annals* of the Association is now in press and will appear during the winter under the editorship of Professor R. E. Dodge. Announcement was made of the election of the following officers for the year 1912: President, Rollin D. Salisbury; First Vice-President, Marius R. Campbell; Second Vice-President, Isaiah Bowman; Secretary, Albert Perry Brigham; Treasurer, Nevin M. Fenneman; Councillor for three years, Lawrence Martin. The next annual meeting will be held in New Haven.

ALBERT PERRY BRIGHAM,
Secretary.

* The effect of the mountains, continents, and oceans upon the earth's attraction or gravity is the subject of an interesting report of an investigation by the Coast and Geodetic Survey of the Department of Commerce and Labor.

The report, entitled "The Effect of Topography and Isostatic Compensation upon the Intensity of Gravity," gives the results of an investigation which approximately establishes a fourth law. It has been proved, as a

result of investigations by the survey of the deflections of the vertical and by similar investigations in other countries, that a condition of approximate equilibrium exists in the earth's crust as well as in its interior. By the earth's crust is meant the first hundred miles, more or less. The continents and mountain masses are not held up by the rigidity of the earth's crust, nor are the oceans thus maintained. But the land areas are floated by a defect of matter beneath them, and the ocean bottoms are depressed and held in place by an excess of matter beneath the ocean areas.

The Danish Explorer, Mr. Frits V. Holm, M.R.A.S., who was the leader of the Holm-Nestorian expedition to Sian-fu, and who lectured on his experiences in the interior of China on January 6, 1910, before our Society, has just been awarded the gold medal of La Société Académique d'Histoire Internationale of Paris.

On December 13, 1911, at la Boissierette near Geneva, is chronicled the death of Monsieur Arthur de Claparède, Doctor of Laws, former president of the Société de Géographie de Genève, and president of the Ninth International Geographical Congress held in Geneva in 1908.

Monsieur de Claparède was chevalier of the Legion of Honor, and honorary or corresponding member of many of the geographical societies of Europe.

The new railroad station on the Jungfrauoch is to be opened during the coming summer, on the railroad line being built to the summit of the Jungfrau. This station is 12,000 feet above sea-level, and in the midst of many of the finest Swiss glaciers, and from it, when the work is completed, visits to these glaciers, formerly accessible with difficulty, can easily be made.

An American expedition to explore Croker Land in the Arctic is now being planned under the leadership of Borup and McMillon. The expedition expects to leave next July.

Dr. Sven Hedin is planning a new expedition to Asia, according to a report in *Science*.

An expedition to Newfoundland will be conducted next summer by Professor R. S. Tarr, of Cornell University, to which a limited number of students will be admitted. The geology and physiography of the island will be studied in the field. The party will carry its own camping equipment.

Roald Amundsen, discoverer of the South Pole, lectured before this society on Thursday evening, December 19, 1907. His subject was "The

Discovery of the North-West Passage." He was introduced by Alba B. Johnson, then president of the society, who entertained him at dinner at the Union League before the lecture. A number of the members of the society met the distinguished explorer—who is one of our gold medalists—on that occasion.

An important article on "Chinese Frontiers of India," by Archibald Rose, the British consul at Teng-yueh, Yun-nan, in the *Geographical Journal* for March, will be found to supplement interestingly the article by Arthur Purdy Stout on "The Penetration of Yun-nan" published in the January issue of the BULLETIN. A sketch map, together with one of the Burma-China frontier, accompany the article.

BOOK NOTES AND REVIEWS

Curtis, William Eleroy. *Turkestan, The Heart of Asia.* Pp. 344. Map and Illustrations. New York: George H. Doran Co., 1911. \$2.00 net.

The great oases of Central Asia are full of mystery and romance. Far separated from the main routes of travel by long stretches of barren deserts, these fertile places in the midst of the sand long remained wrapped in a cloud of mystery, which is but slowly disappearing. Even in recent years with the construction of the Trans-Caspian Railroad by Russia, travellers from foreign countries have been discouraged, if not excluded, from entering. This region, if not actually the cradle of civilization, has been inhabited from far back in pre-historic times and has been repeatedly the seat of world-wide empires. Now, conquered and held by the Russian government, two long lines of railroad extend across its length, meeting at the base of the great mountains of central Asia, and again these ancient cities promise to become centers of trade and commerce, as they were in the distant days when the silks and spices of China and India were carried overland to the west.

This book on Turkestan, with its many illustrations, aims to describe the land and the people as they exist today, and, at the same time, to acquaint the reader with the romantic story of the past, the bloody conquest of the region by Russia, and the present political and economic conditions. Of especial interest in this later connection is the chapter on the cotton growing industry of Turkestan, although here the reader feels that the author has failed to make the most of his opportunity in determining the possibilities of this industry in the Asiatic oases.

Unfortunately the author has allowed many errors to creep into the book, which tend to mar a most readable story and to cast some suspicion on the accuracy of his observations. For instance, the Oxus River is referred to again and again as "one of the largest and most important bodies of water in the universe and the longest river in Asia" (pp. 64, 112, 336), a statement that is very far from the truth. On page 80, the city of Khiva is declared to contain 800,000 people, whereas it has but 30,000. Obviously the Khanate of Khiva is meant. Tashkend is said to be "on the same parallel of latitude as Bombay" (pp. 279, 322) and the Central Asiatic Railroad is carried "over the roof of the world" and half way across the continent (p. 20).

In spite of these errors, however, the reader will find himself absorbed in the story of the past, and interested in the author's personal observations on present economic and political questions.

The book is well illustrated with half-tone engravings and contains a large and most excellent colored map of Central Asia.

Peck, Annie S. *A Search for the Apex of America.* Pp. 370. New York: Dodd, Mead & Co., 1911.

This volume embodies the mountaineering experiences of the authoress on four journeys to South America. Enthusiasm and persistence have always been associated with the mountain cult and rarely have these qualities been more strikingly exemplified than in this narrative. After two unsuccessful attempts on Mount Sorata in 1903 and 1904, Miss Peck turned her attention to the Peruvian mountain Huascaran, the summit of which then became the goal of her ambition. Baffled on four occasions by meager resources and the absence of any suitable assistance in the way of local guides, she refused to accept defeat and persisted in her efforts. These were finally crowned with success in August, 1908, when, with the aid of two Swiss guides, incredible obstacles were overcome and the north peak of the mountain attained. Although the altitude of Huascaran (21,812 ft. and 22,187 ft. for the north and south peaks respectively) as subsequently ascertained by a party of French engineers, proved to be less than the original estimate of Miss Peck, the successful conquest of this Andean peak is an achievement of which she may justly be proud. The unfortunate crippling of one of the guides from the low temperatures encountered on the ascent, and which was apparently the result of his own carelessness, was an incident which the authoress admits detracted from the pleasure of her achievement. In connection with the discussion which arose as to the altitude of Huascaran, attention should be directed to the close approximation of the true height as ascertained many years ago by the Italian *savants* Raimondi.

The volume is typographically pleasing, suitably illustrated and readers are given the benefit of many first-hand observations on the people and the natural resources of the region visited.

Price, Overton W. *The Land we Live In.* Illustrated, pp. 237. Boston: Small, Maynard & Co., 1911. \$1.50 net.

This book carries with it the sub-title, "Boys' Book of Conservation." Its wealth of illustration, its clear and simple style, its concreteness, the absorbing interest of its story, the wise selection of topics and events that will appeal to the healthy-minded boy—all these features should make it eminently successful in the main purpose for which it was written—the education of the young people in the great principles of conservation of our natural resources. But the book deserves—and undoubtedly will have—a far larger audience than the young people. No man of maturity can fail to find it, not only interesting, but instructive and suggestive. It is a most clear, effective and convincing statement of the conservation problem.

Its author, Mr. Price, is Vice-President of the National Conservation Association, a trained forester for many years in the Government Forestry Service, and one of the vigorous leaders in the conservation movement in this country. With him in the planning of the book was associated Mr. T. R. Shipp, secretary of the Conservation Association. The book therefore bears the weight of authority of trained conservationists, adding accuracy and

saneness of treatment to interest and attractiveness of style. Mr. Gifford Pinchot has written an introduction to the book.

The author's method of treatment is to take his readers through a series of imaginary journeys. In Chapter one, the boy reader is taken with the pioneer explorers of 300 years ago across the Appalachians to the Mississippi. Then in succeeding chapters follow journeys in the America of today, showing the changes that have been wrought by man, the needless waste, the wanton destruction. Most effectively is the contrast between the American destructive methods of forestry and the well-planned European methods brought out by first taking the reader in a tramping trip through Germany, and then bringing him to our own great lumber camps, east, south and west; and finally into one of our national forests where the heroic stories of the life of the forest ranger give all the charm of a thrilling tale while at the same time they show the effective work of the Government Forestry Bureau in practical conservation. Mr. Price is most happy in these chapters on the forestry problem.

Chapters on the Nation's Farm, the Treasures Underground, the Rivers, and Wild Life take up the other great resources of our country and the final chapters point out how their conservation affects the boys of to-day and the men of to-morrow and how they may aid in the great movement of saving these resources by wisely using them.

The numerous illustrations, many of them full page half-tones, are, if anything, more important in telling the story than the text itself. One hardly knows which to admire most—their artistic merit, their human interest or the facts they teach. The illustrations cannot fail to arouse interest, even if the text should fail. No greater benefit to the conservation movement can be done than by placing this book in the hands of young people. It would make a most excellent book for supplementary reading in our schools.

ACTIVITIES OF THE SOCIETY.

THE FIRST EXPEDITION TO MT. BLACKBURN, ALASKA.

BY

MISS DORA KEEN.

The January meeting in Witherspoon Hall was addressed by Miss Keen, who gave an illustrated account of her recent attempt in climbing Mt. Blackburn in Alaska. Miss Keen had gone to Alaska to see the wonderful scenery and to become acquainted with the frontier life of the region. The resolve to climb Mt. Blackburn was made after being several days in Alaska. This mountain, 16,140 ft. in altitude, has never been ascended and that it is "worthy of the hardest mountaineer" was abundantly proved by Miss Keen. Although failing to reach the actual summit, Miss Keen's thirteen days spent in making the attempt gave many thrilling experiences and showed a possible route to the summit. Had not the heat of the summer been abnormal, and the last days hindered by a severe storm, the mountain's top would undoubtedly have been attained. Mr. Ralph Fetterolf, one of the members of Miss Keen's party, told briefly of some of his experiences on the ice.

THE EAST COAST OF INDIA.

BY

SUMNER W. CUSHING, PH.D.

Dr. Sumner W. Cushing spent last year in geographical research in Asia, but especially along the East Coast of India. Some of the scientific results of this work appeared in an interesting article in the October BULLETIN. At the February meeting of the society, Dr. Cushing told to a large audience and in a most interesting address illustrated by many lantern slides, the story of his experiences along the Indian East Coast. Doctor Cushing's accounts of the life and customs of the peoples and their relation to their geographic environment was most illuminating and informing as well as full of interest.

PENNSYLVANIA SCENERY.

BY

J. HORACE MACFARLAND,
President American Civic Association.

The March meeting, addressed by J. Horace MacFarland, was of especial interest to the large audience that gathered to hear it, in that it dealt with

scenes near at hand. By a series of artistic photographs, combined with word pictures, Mr. MacFarland was able to indicate in a most striking and forceful manner the marvelous scenic beauty with which Pennsylvania is endowed. He also showed how this same originally beautiful scenery is being wantonly destroyed and pointed out ways and means of conserving this all-too-little appreciated resource.

INTER-MONTHLY MEETINGS.

The regular series of Inter-monthly meetings was inaugurated on Tuesday evening, January 30, when Albert A. Giesecke, president of the University of Cuzco, Peru, gave a comprehensively illustrated talk on "Peru, the Old and the New."

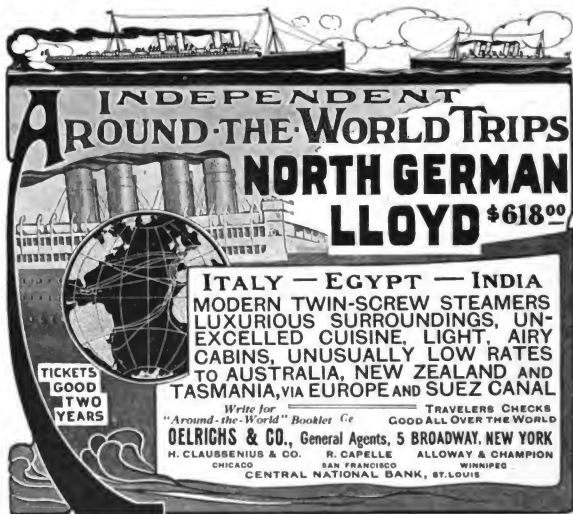
At the same meeting, Miss Mary Blakiston gave a talk on "A Sketch of Lower Dublin Township," illustrated by lantern slides.

The second inter-monthly meeting on February 23 consisted of two illustrated talks, one by Dr. John W. Harshberger on "Rothenburg, Bavaria," and the other by Mr. Jones Wister on "Egypt and the Nile."

Miss Lillian Chittenden Jones gave an illustrated talk on "A Cruise to the Faroe Islands and Iceland" at the third meeting on March 12, followed by Dr. Guthrie McConnell on "A Trip to the Hawaiian Islands."

AWARD OF THE ELISHA KENT KANE MEDAL

By vote of the Board of Directors, the Elisha Kent Kane Medal has been awarded this year to William Morris Davis, of Harvard University, the most distinguished of American scientific geographers, the man who has done most to make geography an exact science, and whose work has been the guide and inspiration of many of the prominent geographers of to-day. The award of the medal will be made at the May meeting. A report of this meeting and fuller accounts of Professor Davis' contributions to modern geography will be given in the July number of the *BULLETIN*.



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THESSALY AND THE VALE OF TEMPE.

DR. WALTER WOODBURN HYDE,
University of Pennsylvania.

I.

"What leaf-fringed legend haunts about thy shape
Of deities, or mortals, or of both,
In Tempe or the dales of Arcady?"

Thus does the poet weave together in his fancy the charms of Tempe and Arcadia. These two names ever call up pictures of beautiful and romantic nature, and both are indissolubly intertwined in our imagination.

First it is romantic Arcadia, with its quiet sylvan retreats and cooling fountains, its lowing cattle and shepherds' pipes, inviting us to scenes of rural simplicity and repose; for such pictures of pastoral enjoyment and careless ease have the poets gathered around this idyllic spot. But only a hasty visit to the

"ridges and winding valleys deep recessed"

—to use Pindar's phrase—of the real Arcadia, suffices to show us by what slender threads such fancies may hang and how utterly unfounded they are in the real nature of this, the Switzerland of Greece. Great corrugated masses of rugged mountains running in every direction, like the gigantic waves of a petrified sea, with beetling crags and intervening cañons and wild ravines, gloomy and dark, with here and there a lofty wind-swept valley, bleak and cold, from whose barren soil, only with the greatest toil, the hardy husbandman can wrest a precarious livelihood—this is Arcadia as it is and as it always has been, a region far better suited to be the retreat of savage animals and untutored men than of Pan and his dancing nymphs. Its frowning ridges and wild defiles, its dark gorges with their torrents dashing headlong for hundreds of feet from overhanging cliffs, suggest anything but the delights of pastoral ease, and withal

are quite opposed to Greek ideas of natural beauty, which delighted rather in the quieter and gentler aspects of nature. One such torrent they called the Styx; its icy stream over against a background of dark moss-grown rock—whence its modern name “Mavroneri” or Blackwater—descends in one unbroken fall nearly seven hundred feet from one of the huge buttress-like precipices of Mt. Chelmos, finally losing itself in a chaos of shattered rock far below. Once I spent two hours in an endeavor to reach its cauldron-shaped base, clinging as best I could to a precarious rock-cut path on the side of the cliff far above the lower stream. This dark and awesome torrent not unfittingly was transferred in Greek fancy from its barren mountain tract to the gloomy realms of the underworld. Still another river in the western part of the country, the Ladon, flows down through an appalling gorge, hemmed in for miles by lofty mountains which descend in immense precipices; a narrow path far up on one side, overhung by the cliffs, affords grand views down into a tremendous glen far below, where the river is seen and heard rushing along—a scene of overpowering grandeur, with scarce its counterpart anywhere. And many a stream, seemingly weary of finding its way through the impenetrable maze of hills, suddenly disappears in some “Katavothra” or fissure in the earth, reappearing, it may be, many miles away.

So the real Arcadia, with its Alpine scenery and its rude and elementary life, could never have inspired the idyllic Arcadia of the poets. This fanciful conception was late in origin, the first indications of its existence—as is well known—only dating back to the degenerate days of Greek letters, when the artificial Alexandrine bards turned longingly from the ennui of city life to the imagined delights of the country for their flagging inspiration, choosing at random this little known portion of Greece, and choosing, as we have seen, injudiciously enough. Some echoes of their way of treating the subject are preserved to us in the eclogues of Vergil, especially in the last, which is full of Arcadian touches. But not till centuries later, in the last years of the Renaissance and in Italy, was this visionary Arcadia finally given a definite and lasting setting. For it was in 1502 that Jacopo Sannazaro's “Arcadia” first appeared, that idyllic complaint in which this love-lorn Neapolitan poured forth the grief of his unrequited passion, and discovered to

the modern world of letters this imaginary retreat of beauty and innocence, which character it has borne ever since.

And so one wonders if the case is similar in regard to the much sung and romantic beauty of Tempe, that "long divine Penean pass," or whether the chorus of tributes by poets ancient and modern to the charms of this

"The lovely tract, through which Peneus flows,
Delightful base from which his awful height Olympus rears"

is founded on something more substantial than Arcadian fancy.

It was my good fortune, during a recent summer's holiday in Greece, to visit Thessaly and its famous Vale, making the excursion there from Athens. For some time there has been railway communication between the Piræus and Larissa, now as of old the capital of Thessaly. In May, 1908, the Greek government authorized the "*Société des Chemins de Fer Hellenique*" to continue this line to the Turkish frontier. But things move with oriental slowness in Greece. For owing to certain outstanding claims against the government, the company has not yet availed itself of the concession. When the road is completed, it is expected that Turkey will continue it from the frontier to Saloniki, which will finally connect the railways of Greece with the continental systems. For even yet Greece is practically an island and the only means of reaching it is by boat. When finally connected with the rest of Europe by railway facilities, it will be possible to journey without change of carriage all the way from Calais to Athens in less than seventy hours. The projected Greek line from Larissa will follow the Peneus and pass right through the vale of Tempe to Keralik-Derveni on the frontier. From there through Turkey it will skirt the eastern foothills of Olympus, through the ancient Pieria, to Gida on the Saloniki-Monastir line. Lovers of the romantic, of course, can hardly imagine such a realistic inroad into their fancy as the whistle of an engine awakening the echoes of Tempe and the fields of Pieria—that earliest home of European song. But on the other hand, the practical advantages will be great, for this famous region, heretofore only known to scholars through literature, will become easily accessible to every traveller to Greece. Just so the railway from Patras to Olympia, and the one from Corinth to Argos passing by

¹ Cf. Eurip., "*Troades*," 214-215.

Mycenæ and Tiryns, have been of incalculable value in rendering these famous sites accessible. But it is a tedious journey to go all the way from Athens to Larissa by rail, unless one intends to break its monotony by stopping off at some of the historic sites en route—at Thebes, Lebadæa, Chæronea or Lamia (for the carriage drive to Thermopylæ). It is far more agreeable to take the old sea-route from the Piræus to Volo, the modern port of Thessaly, and from there to take the short two-hours railway ride to Larissa. A goodly portion of the journey is at night and sleeping accommodations on Greek coasting-steamers no longer inspire the terrors they once did.

So one evening in early August we sailed from the Piræus. The view of receding Athens and the Attic mountains was very grand in the evening haze. The moon had already risen when we passed the promontory of Sunium, where still unsullied by their vigil of centuries, the white columns of Poseidon's temple "gleam along the wave," now as of yore a beacon to sailors in fog and storm, though also a spot long to be avoided, for it was infested with pirates in antiquity and until recently was a favorite haunt of Corsairs. Next morning on awaking, we found we had passed Chalcis and the Euripus and were coasting along the rocky headlands of Eubœa. Lofty Macistus, from whose summit once shone one of the long chain of beacon fires to apprise Clytemnestra that Troy had fallen, was long visible on our right. By noon we were rounding Canæum, the Eubœan promontory jutting out into the Malian Gulf, with Mt. Cæta and Thermopylæ in full view to the west and Mt. Othrys bounding the view to the north. On we sailed through the narrow channel which divides the northern coast of Eulxæa from Achilles' land of Phthiotis. Soon, far along to the right we could see Cape Pontikonisi, the ancient Artemisium, while the distant islands of Sciathus and Peparethus shut out the Ægean beyond. At about three o'clock we entered the land-locked Pagasæan Gulf—the cradle of Greek navigation. Straight in front, rising high above an intervening range of low hills, was the magnificent Olympus. Slowly we leave the Magnesian headland behind us and finally, after passing two rocky islets on our left—the Pyrrha and Deucalion of antiquity—we anchor before Volo, magnificently situated on a low-lying coast at the foot of Mt. Pelion.

Here we are on historic ground. For though Volo is only a



HARBOR OF VOLO.

creation of the nineteenth century, it, like Tripolitza in Arcadia, is the modern representative of three historic towns. A little to the east, in a rich level plain washed by the sea and with a tiny hill for an acropolis, formerly stood Demetrias, founded at the beginning of the third century B. C. by Poliorcetes, who was buried here. Because of its mild climate and its beautiful situation on one of the loveliest of Greek bays and its proximity to the woods and game of Pelion, Demetrias was preferred by the Macedonian kings to the marshy Pella as a residence. As it commanded the approach to Thessaly by sea, it became the station of the Macedonian fleet and because of its strategic importance, Philip V, as Polybius says, called it one of the three fetters of Greece, the other two being Chalcis and Corinth. During the Roman wars it was the chief base of the Macedonians, until it was dismantled after the overthrow of Philip's son Perseus at Pydna in 168 B. C. Later in the Civil Wars it regained some of its importance and we even hear of it in the Middle Ages, when in 1275 a great naval battle was fought in its harbor, between the Lombards of Eubœa and the Byzantines. It remained the seat of a bishop as late as 1721, though before the end of the century it was abandoned and its very name forgotten.

A short distance to the northeast of Volo, at the extremity of the gulf, is a cone-shaped spur of Pelion with the ruins of a church on the top and now known as the hill of Episkopé, commanding a view down over the intervening plain covered with olive orchards and vineyards. This is the supposed site of the acropolis of Iolcus, so famed in the legends of Pelias and Jason. Only a few subterranean tombs, similar in form to the treasuries at Mycenæ, and which were discovered in 1883, serve to identify the spot. In historic times its glory was already gone and the city was destroyed before the time of Strabo. A dry torrent-bed at the foot of the hill, which runs through the neighboring village of Vlacho-Mahala, we may fancy was the stream of the Anaurus, where Jason, returning one day from the chase "when all the mountains and lofty peaks were sprinkled with snow and the torrents descending from them swept roaring along in their courses,"² met Hera in the guise of an aged woman and, while carrying her across the raging stream, lost one of his sandals—in fulfilment of the prophecy that the man who

²"Argonautica" of Apollonius, Bk. III, 66 sq.

appeared before his uncle Pelias with one sandal was destined to overthrow him. And Iolcus was the assembly-place of the Argonauts, who here built their huge ship *Argo*—large enough to hold fifty men and to sail to the distant Euxine—from the pines of Pelion.

A half-hour to the west of Volo, amid undulating hills, was situated the third town, Pagasæ, whose early importance is attested by its lending its name to the whole gulf. Its inhabitants were later attracted away to the new city of Demetrias, and it was only in Roman days that it recovered its prosperity as the port of Pheræ, from which time its present ruins chiefly date. In 1907 there was unearthed here a series of painted sepulchral stelæ, which reflect for us more faithfully than anything else the painter's art of the third and fourth centuries B. C.

Volo itself, apart from the beauty of its surroundings, and the wealth of legend associated with this site, has little else than a commercial interest. It is a very prosperous town with regular streets, its blue and pink houses along the "Skala" or quay looking very picturesque from the harbor. Most of the Turkish inhabitants, who lived apart in the "Kastro" or walled town, have moved away since 1881, when Thessaly became a part of Greece. But the glory of Volo is the massive forest-clad Pelion which rises over five thousand feet from the shore, dominating this whole end of the gulf. On the shelving sides of its lower slopes are many flourishing villages. The Turks, when they monopolized the surrounding plains, left the hills to the Greeks, who were here stimulated to great industry, carrying on a large trade in silk, honey, oil and wine. One of these towns, Zágora, even under Ottoman rule, manufactured and exported great quantities of silk. Another, Makrinitza, still preserves the ancient art of gem-cutting, as most of the intaglios now sold in Greece come from here. Above these villages is the dark belt of forest extending to the summit and giving to Pelion its character and its modern name of "Mavro Vouno"—Black mountain. What the violet-tinted Hymettus is to Athens, Pelion with its dark sides is to Volo—a truly magnificent sight. The summit over the town had a sanctuary of Zeus Actæus in antiquity, to which the nobles of Demetrias each year led a procession, all dressed in the fleeces of sheep. Near the crest we can plainly see a cavern which has been

called the cave of Cheiron, the Centaur, where that earliest of the tribe of schoolmasters taught his famous pupil the arts of knight-hood. For Pelion is famed in mythology. On its slopes was celebrated the most famous of all weddings, that of Peleus and Thetis, where the gods were present and brought gifts, and, reclining on their ivory couches, listened to the three sisters of Fate as they chanted the fortunes of Achilles, the son to spring from this union of a goddess with a mortal; the Nereids danced and Ganymedes dispensed nectar, but at the height of the festivities, Discord threw in the fateful apple, the cause of so much subsequent woe to mortals.

It was about five o'clock in the afternoon when we left Volo for Larissa. Soon the blue waters of the gulf and the richly tinted Magnesian promontory were left in the distance. The rugged length of Pelion shut off our view to the eastward. Out over the rich plain to the north of Volo, through the little pass of Pilaf-Tepi enclosed by hills, the railway follows the ancient road, the only practicable egress to the sea from the interior of Thessaly. Beyond the pass we come to the pretty little village of Velestino. This is the ancient Pheræ, where fable has it that Apollo once tended the flocks of King Admetus and where noble Alcestis lived. The beautiful scenery hereabouts is in harmony with this noble legend. A pool of limpid water embowered by plane-trees, and now known by the euphonious name of *κέφαλο βρύσι* beneath the ancient acropolis, may well have been the Homeric Hypereia.³ Here, wretched Andromache, in accordance with Hector's prophecy, was doomed, as the slave of a Grecian prince, to perform the same menial services of drawing water as the women of the village do to this day. In historic times Pheræ attained considerable importance through her one great citizen, the tyrant Jason, who extended his rule over Thessaly and whose designs on the sovereignty of all Greece were only cut short by his untimely death. In modern times Velestino has enjoyed fame among Greek towns, for it was the home of Rhigas, the patriot poet of the modern Greeks, who was shot here by the Turks in 1798.

We next traverse the monotonous Pelasgian plain. To the right we catch a glimpse of Lake Karla—the ancient Bœbeis—and our view further east is now bounded by the magnificent chain of

³ "Iliad," VI, 457.

Pelion, Ossa and Olympus, the conical summit of Ossa in fine contrast to the majestic breadth of the other two. Off to our left is the low range of the Cynoscephalæ hills, made memorable by the victory of Flamininus here in 197 B. C., when the Romans finally gained from the Macedonians the sovereignty of Greece.

All around us stretch fields of maize. These broad Thessalian plains seem particularly well adapted to successful farming. But though the ground looks so fertile, we found that agriculture here as everywhere in Greece was in a backward state. The system of small peasant holdings in vogue ever since the Revolution has always been an obstacle to scientific farming methods. Still to-day throughout the mountainous districts and the islands, farms would scarcely average an acre in extent, and even on the plains one of fifty acres is very exceptional. Through centuries of Turkish spoliation and insecurity, the peasants lost their stimulus to labor, and do not seem to have overcome their indifference yet. Though it is computed that nearly half the present population is engaged in agricultural and pastoral pursuits, the modern Greeks do not seem to be an essentially agricultural people any more than their ancestors were, and so do not make the most of their land. Only 18½ per cent. of the surface of the country is under cultivation to-day. About 8 per cent. more is given over to pasturing and 9 per cent. to woodland. The remaining portion—of course a large fraction is composed of barren mountain tracts—is uncultivated.* A large amount of the grain consumed is now imported from Russia just as in antiquity. Both the methods and implements of farming are primitive in the extreme. Modern machinery is looked at askance. The plough and the harrow have hardly changed since Hesiod's day. The ox-goad (*βοιόετρον*) and the shepherd's crook might well have been copied from ancient vase paintings. The peasant seems contented with his ancestral system, and is slow to adopt any innovation. Labor-saving devices have little attraction for him, for his time is not valuable. The climate assures fairly good returns for little expenditure of labor. He does not bother himself with problems of irrigation, fertilizing nor the rotation of crops. He is childishly superstitious and puts his faith in God rather than himself, and often continues to plant where several crops have already failed. In Thessaly conditions seem even worse than elsewhere.

* Cf. Bædeker's "Greece" (1909), p. xlii, for statistics.

The largest farms in Greece are on these fertile plains, some exceeding 250 acres in extent; but most of these are in the hands of the government, or are still owned by Turkish proprietors whose only interest in them is the rent. The harvests are often ruined by early frosts, and parts of the plain are still subject to damaging floods. The peasants are poor and only recently have been able to borrow from the government. All these causes combine to keep agriculture backward in these naturally rich plains. A good deal of progress has been shown here and elsewhere in Greece during recent years, but until more capital is invested and larger holdings are in vogue, Greek agriculture must continue to be backward.

Soon we see the minarets and cypresses of Larissa peeping out from a hollow in the plain. Delightfully situated on a bend of the Salamvria—the ancient Peneus—Larissa is enjoyable even in the heat of a Greek summer, as it is cooled by the winds from the Cambunians and Olympus and Ossa. The modern town has many fine straight streets and the inevitable “plateia,” or square, of every Greek village with the usual scenes, the tables of the adjoining restaurants being set out beneath the trees. It is now the capital of the nome of Larissa—the present name of the eastern half of Thessaly—and the residence of an archbishop. In walking about the streets we soon perceived the oriental character which is characteristic of all Thessalian towns; the minarets and mosques—now the finest in Greece—the tall cypresses and the houses of mud and brick with trellised windows, or high walls blank to the street, hiding some old Turkish court with its charming fountains and colonades. In the bazaar we saw many Turks still engaged in keeping shops. We learned that they, like the Greeks and the Jews—descendants of the old Spanish Jews—still lived in separate quarters; for Larissa is the last large Greek town to contain a considerable Turkish population, though their number is fast diminishing. They have been here ever since they took the place in 1390. They then called it “Yeni-shehr” or “New Town,” erroneously thinking that the inhabitants had removed hither from the then deserted Crannon, whose ruins lie several hours to the southeast and now go by the name of “Palæo-Larissa” or “Old Larissa.” But with the Greeks, Larissa has always kept its ancient name from the mythical days of the Lapiths, who dwelt hereabouts, to the present. Indeed

the name is Pelasgic in origin and is supposed to mean "city," a name not uncommonly applied to prehistoric sites elsewhere in Greece and a sure sign of their antiquity. In the fifth and fourth centuries B. C., Larissa was an important place, when the family of the Aleuadæ held the place, while their kinsmen, the Scopadæ, ruled over the neighboring Crannon. The later Greeks always looked upon them as traitors, as they first sided with Xerxes⁵ and later with Alexander against the rest of Greece. Indeed "*Θεσσαλὸν σόφισμα*"—a Thessalian trick⁶—was proverbial among the Greeks owing to the faithless character of the people, and "*Θεσσαλὸν νόμισμα*"—Thessalian money⁷—was synonymous with false money.⁸ Though always an important place, little of a striking character ever happened in Larissa. In all its long history, it can only boast of one great citizen, the physician Hippocrates, who, though not a native, ended his days here. Like most old towns continuously inhabited, Larissa has but few memorials of the past. The old acropolis is, of course, the little hill upon which the cathedral now stands; at its southwestern corner, may still be seen a few remains of the bottom row of seats of the ancient theater; a few sepulchral reliefs, found in the cemetery in 1882-3, are now the chief treasure of the local museum, though the best have been taken to Athens;—and this is all. In strolling about the town, every now and again we were charmed with unexpected glimpses of Olympus and Ossa far away to the east, with the giant cleft between them, which we knew was Tempe.

The favorite evening walk of the townspeople is down to the river and out over a quaint old bridge with Gothic arches. Below quietly flows the Peneus, known since the Middle Ages by the un-Greek name Salamvria.⁹ Its banks are picturesquely covered with gardens and trees. Even in summer it is a stream of goodly volume, since its headwaters are fed from the late melting snows of distant Mt. Lacmon at the center of the Pindus range near the Macedonian

⁵ Cf. Hdt. 7, 6.

⁶ Cf. Eurip., "Phoen.," I. 1407.

⁷ Cf. Photius' "Lexicon" (of the 9th century).

⁸ Demosthenes sums up their character by saying they are "faithless, by nature and always to all men." See "Olynth.," I, 22.

⁹ The name first occurs in Anna Comnena's "History of the Byzantine Empire" (5, 141), written in the early twelfth century.

border, that mountain mother of rivers, from whose base rise the five chief "liquid ways" of North Greece, on the one side the Arachthus, Achelous and Aous, and on the other the Peneus and Haliacmon. This was the mountain chosen by Vergil (at the end of the Fourth Georgic) as the scene of the poetic vision of Aristæus, who having lost his bees, travels from Tempe to the source of the Peneus, where in his mother's cave he sees in diverse quarters "all the rivers gliding neath the mighty earth." The waters of the Peneus remind one of the "flavus Tiber," though the ancient writers almost universally remarked on its wonderful clearness. Just how such a mistake was made is curious enough, resting upon a wrong interpretation of a passage in the *Iliad*. In the late "Catalogue of the ships"¹⁰ the Titaresius, the largest affluent of the Peneus from the north,

"Pours his fair-flowing waters into the Peneus and yet
Does not mingle with its silver-eddyding surface,
But flows on over it like oil; for it is a branch of the
Stygian stream, that witness of the awesome oath."

From this description it was thought that the poet meant that the Peneus was clear and the Titaresius muddy. So Pliny¹¹ says the Peneus "clear beyond all rivers" (*ante cunctos claritate*) carries the waters of the Titaresius for a time gliding over it like oil, and then rejects them, refusing to allow "waters devoted to penal sufferings and engendered for the Furies, to mingle with his own silvery streams." Strabo (I. 441c) explains the oily nature of the Titaresius not wishing to unite with the clear Peneus as due to some woody substance in it, while a late Latin writer, Vibius Sequester, says (p. 19) it was due to some metallic quality. Lucan in a fine descriptive passage of the *Pharsalia*,¹² likewise tells how the Titaresius glides over the Peneus like water over fields, and he explains the phenomenon by a reference to its Stygian origin. But the testimony of all these writers is worthless, for none of them ever saw either river, and, like so many modern travellers, who have never visited the Titaresius, contented themselves with merely trying to explain Homer's words. The connection of this river in Homer with the Arcadian Styx, was doubtless related to some Thessalian

¹⁰ "*Iliad*," 2, 751-3.

¹¹ H. N., 4, 8.

¹² VI, 375 sq.

cult of the Lower World of which these later writers were ignorant. It is strange that in the modern folk lore somewhat of the Stygian character of the Titaresius still lingers, now transferred to the Salamvria, which in several ballads is called the river of death and which has some of the power of the Lethe. Just so, some of the old associations of the Arcadian Styx still linger in that locality. Leake¹³ visited the Titaresius and found its waters "clear" and "pellucid." Homer was right—as Dodwell first pointed out¹⁴—for his epithet "silver-eddy" (*ἀργυροδίη*) refers not to the clearness of the Peneus but to the silvery gleam reflected from its yellow surface. He uses the same epithet of the muddy Simois and Sca-mander, and it is used by other writers of the Achelous for the same reason. The Titaresius, rising in the snows of Mt. Titarus, is, like most mountain streams, extremely clear, and its swift current makes its waters distinguishable for some time after they meet the sluggish and turbid Peneus, which flows in a long and winding course through a flat and sandy plain. Though so dirty, its water when filtered is still used by the inhabitants of Larissa and Trikkala. It was Theophrastus who alluded rightly to its color when he said that the sheep which drank of it had black wool.

Very early next morning we started on the long thirty-mile carriage drive to Tempe. The road, which in general follows the course of the old military way along the Peneus, and is the same one over which the Delphian embassy sent every ninth year to Tempe in quest of laurel, used to go,—was very rough and inconceivably dusty. At times the carriage would jolt so much that we had difficulty in keeping our seats. We first crossed the rich Pelasgian plain, which is dotted with prehistoric mounds. Now and then we passed country carts with solid spokeless wheels, a curious survival of the "tympana" once used on baggage carts, and still to be seen sculptured on the arch of Severus and the column of Antoninus in Rome. The ever nearer views of the majestic Olympus and Ossa before us, took away all sense of monotony and helped us to forget the road with its clouds of dust and the heat. After a couple of hours we passed the outlet of Lake Nessonis—now called Nezero or Karatjari—which, though it attains the dimensions of a lake in

¹³ "Travels in Northern Greece," 1835, III, 396, and IV, 296.

¹⁴ "A Classical and Topographical Tour through Greece," 1819, II, p. 110.

winter, is now only a swamp. It is a continuation of lake Bœbeis which we had seen in the distance from the train the day before. Hereabouts was the ancient Gyrton, the hold of the fabled Lapiths and the scene of their fierce contests with the Centaurs, which later came to be so favorite a subject for Greek sculptors. At no great distance to the left on the bank of the Peneus, we could see the tiny village of Baurina with ruins generally supposed to be those of Elateiá. Soon we passed another village, Mavrochori, which though far from the river, is opposite the confluence of the Titaresius—now called the Xeraghi or Saranta-Poros—with the Peneus. Off to the right at the base of Ossa are two tiny towns, Mikro- and Mega-Kisserli, embosomed in vineyards.

As we drive over the plain, we realize what the greater part of Thessaly really is—a huge basin hemmed in on every side by mountain walls. Pliny well described its contour when he spoke of its mountain barriers as “curved in amphitheatre form.”¹⁵ For the plain is literally surrounded by a “chorus of mountains”—to use a poetical phrase of Thackeray—and was often called by Greek writers “Hollow Thessaly.”¹⁶ However, it is not one unbroken plain, but is divided by low hills into several different sections which successively open out into one another. A better idea of the nature of the country could be gotten from one of the passes over the encircling mountains. Thus Livy’s famous description was taken from Thaumaci (the modern Domokó), at the top of the pass of Cœla, which extends over the back of Othrys from Lamia on the Malian Gulf. He fancifully derives the name of this little town “Wonderland,” from the astonishment (*θαυμάζω*) of the traveller, who, after “passing through the rugged districts of Thessaly, where the roads are entangled in the windings of the valleys,” finally arrives here, where “on a sudden an immense level expanse, resembling a vast sea, is outspread before him in such a manner that the eye cannot easily reach the limits of the plains extended beneath.”¹⁷ The artist Edward Lear has finely felt the charm of this, the characteristic of Thessaly’s scenery, when he said: “The very simplicity, the extreme exaggeration of character of a plain is not without its fascination; and the vast lines of Thessaly have a wild and dreamlike charm of

¹⁵ “Theatrali modo inflexi,” *Hist. Nat.*, 4, 8.

¹⁶ “καὶ ἡ Θεσσαλία,” *c. g.*, in *Hdt.*, 7, 129.

¹⁷ 32, 4.

poetry about them, of which it is impossible for pen or pencil to give a fully adequate idea."¹⁸

The Roman poet Lucan, in his "*Pharsalia*,"¹⁹ has given a beautiful description of Thessaly's mountain ring, quite true to the actual conditions. For as we drive on, we see stretching all along our left on the north the irregular range of the Cambunians; behind us, along the western horizon, is the serrated range of Pindus—the beautiful old name long since replaced by the ugly one of "*Bugikaki*"—with its almost even sky line; to the south from Tymphrestus to the Pagasæan Gulf are the irregular summits of Othrys—now called "*Pylorá*," the gate-keepers; while before us, shutting off all view of the Ægean to the east is the wonderful wall formed by the chain of Olympus, Ossa and Pelion. The snow-capped summits of Olympus, the highest and grandest of all, like a huge sentry at the northeastern corner, dominate all. And the grandeur of these two mountains rising majestically on either side of the deep chasm of Tempe, increases every moment we come nearer. To the left of the giant rift, is the mighty bulk of Olympus, its many peaks towering nearly ten thousand feet into the clear blue heavens, like a huge keystone in the arch of mountains along the northern and eastern sides of the plain, its remoter swells finally blending with the far-off ranges of Pindus and Othrys. Greek fancy did well to see in the lofty summits of this their most imposing mountain, the symbol on earth of the ideal mountain which contained the habitations of the deathless gods. There is a grand passage in the *Odyssey* describing this the center of Greek mythology:

"And gray-eyed Athena thus speaking vanished away to Olympus, where men say is the seat of the gods, forever and without end; nor is it shaken by winds nor ever wet with rainstorms, nor doth snow come nigh to it; but over all is cloudless splendor outspread, and over all gleams a bright radiance. Therein rejoice the blessed gods all their days."²⁰

Hardly less grandly were Homer's words paraphrased by the Roman Lucretius in that splendid apostrophe to Epicurus at the beginning of the third book of the "*De Rerum Natura*":²¹

¹⁸ Quoted in Murray's "*Greece*."

¹⁹ *Ll.* 333 sq.

²⁰ *VI*, 41-6.

²¹ Lines 18-24.



RIVER PENEUS WITHIN THE VALE.



INTERIOR VALE (LOOKING EAST NEAR EXIT, WITH OLD MILITARY ROAD).

"The divinity of the gods and their calm abodes appear, which neither the winds disturb nor the clouds with showers o'erflow, nor white falling snow congealed by sharp frost doth spoil; but the unclouded air covers them always and smiles on them bounteously with diffused light. Nature supplies all their wants nor does anything destroy their tranquility ever."

Here the father of gods and men had his abiding place, built by Hephæstus, on the "topmost peak of many ridged Olympus," which towers far above the earthly *δαίρ* into the *αἰθήρ* of heaven and where he was wont to sit alone or call the gods to council.²² When he spake "and nodded his steel-gray brows and his ambrosial locks waved from his immortal head,"²³ all Olympus was shaken. His might is also depicted in this magnificent address of Agamemnon: "O Zeus, most glorious, most powerful, wrapt in dark clouds and dwelling in the æther."²⁴ The other immortals had their builded dwellings upon the other precipices and in the ravines of the mountain.²⁵ Just below the summit is the region of clouds, which Zeus delights to compell and dispell at will, and which, guarded by the Hours, are called the gates of heaven, marking the bounds between earth and sky. "Of their own free will groaned upon their hinges the gates of heaven, which the Horæ guard, to whom have been entrusted great heaven and Olympus, both to open the thick cloud and to close it."²⁶ Later on Olympus came to be used metaphorically for heaven, but all through Greek history it never entirely lost the earliest associations which it acquired when the Hellenic race lived in this neighborhood. Though for centuries now the mountain has been in Turkey, it is still Christian. Its many monasteries are all dedicated to the Holy Trinity, a transfer of the classical associations of the locality from the supreme Greek god to the Christian Godhead.

As we slowly approach, we see how the huge mass is furrowed and ridged by gigantic seams well meriting the Homeric epithet "many-furrowed" and "many-ridged."²⁷ There is a great basin in

²² "Iliad," V, 753-4 and VIII, 2-3.

²³ "Iliad," I, 528 sq.

²⁴ "Iliad," II, 412.

²⁵ "Iliad," XI, 76-7. *κατὰ πτόχας Οὐλύμπωιο.*

²⁶ "Iliad," V, 749-51.

²⁷ "Iliad," VIII, 411, *πολυπτύχου Οὐλύμπωιο*, and I, 499, *πολυδεράδος Οὐλύμπωιο.*

the heart of the mountain, invisible from this side, which is closed by two parallel chains of summits running east and west, thus dividing it into a northern and southern portion joined by a saddle at the western end. The northern chain, overlooking Macedonia, contains all the higher peaks, so that from that side the mountain, rising at once from the plain and the sea to its full height, is a far more impressive sight than from the Thessalian side, from which only the southern line of summits, more or less shapeless, and more devoid of the sharp-cut outlines so characteristic of the northern peaks, is visible. A cluster of three peaks just above the saddle and at the western end of the northern chain—dwarfed from our view by intervening heights—are the highest of all. They are known by the Greeks on the mountain as the "Three Brothers,"²⁸ the loftiest being known as the "Monk" (*καλόγερος*), doubtless so-called from its hoary head in winter. The peaks of the southern chain overlooking Thessaly are not so lofty, Mt. St. Elias (opposite a peak of the same name in the northern chain) being the highest and for a long time supposed to be the summit of the whole mountain. The long interval between these southern peaks and the buttress walls above the vale of Tempe is divided up into gorges and ridges and valleys, the lower parts being still covered with forests as in the days of Euripides.²⁹ One of the chief sources of revenue of the monasteries are the many saw-mills on the mountain sides, where the timber is cut by very primitive methods. Mt. Livadaki (or Metamorphosis), rising above the romantic Lake of Nezero, is the most conspicuous peak in this lower region. But far above the line of vegetation stretch the magnificent "barrier crags of precipitous Olympus"³⁰ into the clear blue sky, a broad though broken surface of naked gray rock with here and there—even in late summer—patches of snow, offering a fine contrast to the darker hue of the forest-clothed lower reaches.

Still almost alone of all Greek mountains, Olympus has retained its old name but slightly changed into Elymbos.³¹ This name simply

²⁸ *Τὰ τρία ἀδέρφια*. In some of the Romaic ballads the "Three peaks of heaven." Cf., e. g., Passow, "Carmina Popularia," No. 754 *b*.

²⁹ Cf. "Bacchæ," 560, "the wooded lairs of Olympus (*ἐν ταῖς πολυδένδραις ἐν Ὀλύμπου θαλάμας*).

³⁰ So the Orphic poet of the "Argonautica," L, 462.

³¹ Tozer, "Researches in the Highlands of Turkey," Vol. II, p. 19, found the ancient name unchanged still in use by the Greeks of the mountain. For the etymology of the name cf. Curtius, "Etymologies," under *λύμω*.

means "glistening," and was a common designation of lofty mountains in the Greek world, just as "White Mountain" in modern times is a generic name for a snow-clad peak. Homer called it "dazzling Olympus"³² and often applied to it the epithet "snow-capped."³³ Sophocles spoke of its "gleaming radiance,"³⁴ and even yet in the Romaic ballads "white as Olympus" is not an uncommon comparison.³⁵

We had but lately come from the Alps where we had made the ascent of Mont Blanc, and so were eager to scale Elymbos. But we found on inquiry that this was no easy task. Several climbers have been to the top of its various peaks and made a study of its contour,³⁶ but still, this—the most famous of old world mountains—is only imperfectly known. This is not so much owing to the natural difficulties of climbing, which only require a fair knowledge of mountaineering, but rather to the jealous care of the Turks that the mountain shall not be mapped, and the consequent obstacles in the way of getting permission to visit it, and also to the actual risks which one runs when accompanied by a squad of unwilling Turkish soldiers. Its cliffs and glens are now for the most part the unmolested retreats of chamois, deer and even wolves. The danger from the bears which are said to have formerly infested them has happily been averted by the goodness of St. Dionysius, of whom the Greeks tell a very pretty story, rivalling that of St. Patrick in ridding Ireland of snakes. Called one day from his ploughing, he found, on his return, that a bear had devoured his ox; catching the offender, he forthwith harnessed him to his plough, so that all the other bears, in fear of similar treatment, immediately fled the mountain.

To the right of the defile of Tempe, as if protected by its giant neighbor, rises in less grandeur the smaller Ossa, now known in Greece as Kissavos. Its contour is in sharp contrast to the great breadth of Olympus, for it has only one pyramidal summit, an imposing sight as you approach, for it seems almost to overhang the

³² "Iliad," I, 532. ἀγλαῆτος Ὀλύμπου.

³³ "Iliad," I, 420, ἀγάννιφος and XVIII, 616, ὑφέεις, are examples.

³⁴ "Antigone," 610, Ὀλύμπου μαρμαρέσσαν ἀγλάν.

³⁵ Passow Coll., No. 300.

³⁶ Best accounts of ascents are those of Tozer, "Highlands of Turkey," Vol. II, ch. XVIII (with map of the mountain on p. 17); Heuzey, "Le Mont Olympe et l'Acarnanie"; Barth, "Reise durch das Innere der europäischen Türkei."

plain. The early legends of Thessaly, quite in harmony with the rugged features of the land and the license of the people, tell of terrible battles, where the combatants, like the Lapiths and Centaurs, used trees and rocks for missiles, or, like the Titans and the later Giants, hurled rocks and hills at one another and even piled mountain on mountain. So Homer²⁷ tells how the youthful Otus and Ephialtes, the sons of Alcæus, exulting in their strength—for at nine years they were nine cubits in breadth and nine fathoms in height—threatened heaven by piling Ossa on Olympus and Pelion on Ossa, until their presumption was finally humbled by the shafts of Apollo. As we look up at the conical peak of Ossa, we can only wonder how the long mass of Pelion could be made to balance upon it without toppling over. Vergil makes the piling up of these mountains even more difficult to understand. For he has it that the Titans, Cæus and Iapetus, together with the monster Typhoeus made three attempts to scale heaven by piling Ossa on Pelion—so far so good—but piling on top of all the huge Olympus!²⁸ Lucian, in his "Contemplantes" rivals both Vergil and Homer in daring. As Homer had made it possible in a moment to scale heaven with the ease of a distich, Charon and Hermes imitate him in first placing Pelion on Ossa, and then, in order to get a better view, they put Cæta on top of Pelion and the bulky Parnassos on top of the pile, from the twin peaks of which latter mountain they survey the follies of earth. Charon is fearful lest the fabric be too slender, but Hermes reassures him, takes him by the hand and only admonishes him not to slip. We could better conceive of the great battle between the Gods and the Titans as related by Hesiod. Olympus is assigned to Zeus and the other sons of Cronus, while Othrys, far off to our right, was the fortress of Cronus and the other Titans. He thus grandly represents the end of the long ten years' struggle,²⁹ the first lines of which forcibly remind us of the closing scene in Æschylus' Prometheus:

"Th' immeasurable sea tremendous dash'd
With roaring; earth re-echoed; the broad heaven
Groan'd shattering; vast Olympus reel'd throughout
Down to its rooted base beneath the rush

²⁷ "Od.," XI, 315 sq.

²⁸ "Georgics," I, 281 sq.

²⁹ "Theogony," 678 sq., translated by Elton.



WESTERN ENTRANCE OF VALE.



INTERIOR (LOOKING WEST).

Of those immortals; the dark chasm of hell
 Was shaken with the trembling, with the tramp
 Of hollow footsteps and strong battle-strokes,
 And measureless uproar of wild pursuit.
 So they against each other through the air
 Hurl'd intermix'd their weapons, scattering groans
 Where'er they fell. The voice of armies rose
 With rallying shout through the starr'd firmament,
 And with a mighty war-cry both the hosts,
 Encountering, clos'd. Nor longer then did Jove
 Curb down his force; but sudden in his soul
 There grew dilated strength, and it was fill'd
 With his omnipotence; his whole of might
 Broke from him, and the godhead rush'd abroad."

etc.

In modern times both Olympus and Ossa played a prominent rôle in the Greek war of independence. One of the best known of the modern Klephtic ballads—those artless and spontaneous songs of the blind and often unlettered beggars, who in Turkish days frequented village fairs and sang their ballads like the Epic bards of old—tells of the strife existing between the two mountains. It is known by heart to every Greek, and I have often heard it sung in village taverns, as I journeyed about the country. Olympus regards Kissavos (Ossa) with contempt, as being Turkish ground. The opening lines run thus:⁴⁰

"Olympus and Kissavos, the two mountains, were at strife;
 Thereon Olympus turned and cried to Kissavos:
 'Revile me not, O Kissavos, trampled by Turkish feet!
 I am the old Olympus, in all the world renowned;
 I have two and forty summits and two and sixty springs—
 For each spring I have a banner, for every branch a Klepht.'"

For Olympus—like Pelion and Pindus and the mountains of Agrapha—was a favorite haunt of the Klephts, those famous bands of outlaws of the eighteenth century, who set at naught the authority of the Turks in Greece. From their mountain retreats they made constant descents upon the plains, carrying off a Pasha or an Aga to hold for ransom, and at times, it must be confessed, laying their own countrymen under tribute. The Turks, tired of the ceaseless guerilla warfare, tried in every way to placate them, and even gave

⁴⁰Transl. by Sir Rennell Rodd in "Customs and Lore of Modern Greece," p. 228/9. Original text in Passow's Coll., No. 131.

them a certain amount of independence. But many of the braver refused to submit on any terms and defied the Turks to the end, thus keeping aflame the fires of liberty. They knew every glen and rock of their beloved mountains and were able to keep at bay large forces sent against them. Though their Greek kinsmen of the plains lost severely by their raids, nevertheless they sympathized with them and made these Robin Hoods the heroes of their ballads. Though the name "klepht" (κλέφτης) means literally a "robber," these bold mountaineers had nothing in common with ordinary thieves. More recently robbers of a far less engaging kind have infested Olympus and Ossa. During the last war with Turkey many free-booters lived here and made Tempe quite unsafe. One could not visit the vale without first having had a squad of Greek soldiers prepare the way. I quite well remember having seen a photograph of such a company of bandits, who were bound to flat boards and set up in a row and shot.

As you look out over the mountain-locked plain, you can understand how geology and legend concur in picturing Thessaly as once an inland sea, until finally its waters, through some superhuman agency, broke their way through the cleft which separates these two mountains. All through antiquity it was commonly believed that Tempe was once closed and Thessaly was under water.⁴¹ The myth of the flood of Deucalion is doubtless only a reminiscence of it. The old writers thought that Tempe was the result of earthquakes which rent the mountains apart.⁴² The Thessalians themselves, as Herodotus recounts, attributed the cleavage to Poseidon, the "earth-shaker" (though others to Hercules⁴³) who with his trident drained their country.

Such myths are common enough elsewhere. Thus the natives of Kashmir in India explain the formation of their valley as the result of a thrust of Ali's sword. We know from a Scholium to Pindar⁴⁴ that Poseidon, in commemoration of his interference, was worshipped in Thessaly under the name *περπαῖος*—the rock-cleaver. Another reminiscence of the tradition is the earlier name of the Peneus,

⁴¹ For collected passages from ancient literature, see Kriegk, "Das Thessalische Tempe," pp. 35-39.

⁴² Cf. Strabo, 9, 5, 2 and Hdt., VII, 129.

⁴³ Cf. Diodorus, IV, 58, and Lucan, VI, 348.

⁴⁴ Pyth., IV, 245.

which Strabo⁴⁵ says was once called the "Araxes"—the "breaker" from breaking its way through the mountains, while the classical name of the pass itself "*τά τέμνη*" means "the cuttings." And geologically this can be the only explanation of Tempe, for the whole of Thessaly is drained by this one river only with its tributaries, which has its exit here. The similar correspondence of the rocky walls of the chasm, in respect of striation and contour, is proof that Olympus and Ossa were once joined. Greece furnishes many similar effects of earthquakes, as the gorge of the Ladon already mentioned, and especially that of the Pharangi in Crete, where the river for four miles rushes through very close mountain walls.

And the early myths of the struggles of the Centaurs and Lapiths, the two prehistoric tribes of Thessaly, seem to be an echo of that far-off conflict between mountain and plain. The Lapiths are represented as an orderly people dwelling in the plain, where they tame horses, thus laying the foundations of the later glory of the country.⁴⁶ But the Centaurs at first were conceived of as merely savage men, "wild tribes of the mountain caves,"⁴⁷ who lived on the flanks of Pelion. Their equine form, so well known from later poetry and art, was unknown to Homer and dates only from the time of Pindar.⁴⁸ In the "Shield of Hercules," while the Lapiths are described as using the ordinary weapons of warfare, javelins or spears, the Centaurs, true to their savage character, employ forest trees and rocks. After severe struggles, in consequence of the license of the Centaurs at the marriage feast of Pirithous, the king of the Lapiths, the hill tribe is finally vanquished. This seems to be only a poetic account of a prehistoric conflict between brute force and organized intelligence. The later myth of the marriage of Peleus and Thetis, the hero of the land with the goddess of the sea, poetically expresses the calmer times which followed the shocks

⁴⁵ II, 14, 13.

⁴⁶ Mr. J. C. Lawson, in his recent work "Modern Greek Folklore and Ancient Greek Religion: a Study in Survivals" (1910), identifies the Centaurs with the monsters of modern popular fancy known as the "Callicautzari." They were, he thinks, a tribe of sorcerers whom their Achæan neighbors held in awe for their gift of assuming different animal forms (their equine shape being merely symbolic of this power) and called "pheres."

⁴⁷ "Iliad," I, 268.

⁴⁸ Pyth., 2, 82.

which Thessaly had undergone long before. The country was not only un-Greek in its scenery, having neither the maritime nor mountainous character of the rest of Greece, but was always looked upon by the other Greeks as only semi-Hellenic in its population. Its mountain walls isolated it from the rest of Greece. For though it was the home of Jason, Achilles and Alcestis, and contained within its borders the revered Olympus, still its history throughout antiquity was quite aloof from the general current of the other states of Greece. Thessaly was always the home of arrogant tyrannies whose power was supported by cavalry, and contained no middle class nor free institutions from which to recruit armies of infantry as in other Greek states. So somewhat of its early rude character lasted all through classical days. The gluttony of its inhabitants was proverbial,⁴⁹ and it was ever a land where violent outbreaks and lawlessness thrived, a land which Plato⁵⁰ describes as being "full of anarchy and license."

(To Be Concluded.)

⁴⁹ Athenæus, 418 B sq.

⁵⁰ Crito, 53.



SUNSET ON MANILA BAY. This is an actual photograph of the sun when almost at the horizon and quite red in color.



The inter-island shipping discharges directly along the river quay.

MANILA.

CHARLES A. GILCHRIST.

Unless the American traveller in Manila is careful to hide his light under a bushel, he is apt to be taken in hand by his fellow countrymen and shown a thoroughly good home-like time. For the most part the American residents grow to like the life in the tropics very quickly and they are eager to show visitors why. Someone has referred to the life in Manila as one of "specialized luxury"—a designation rather startling to ideas of Manila as held in the United States. However, the anomaly can be explained, for while we of the East have to do without oysters and concerts, still, there is literally and metaphorically no winter of our discontent, no furnace fire to look after, no seasonable change of clothing to worry over and above all we are never in a hurry.

So it is that only after a time does the visitor begin to see things of indigenous interest, and among these the Spanish monuments are the most obtrusive. Intramurus is probably as fine and well preserved an example of an ancient walled city as can anywhere be found. From the continuous parkway which now almost surrounds the Walled City there are fine views of the old moss-grown ramparts with their jutting bastions above which are seen low tiled rooves and the towers of many churches. Besides three breaches that have been made in the walls to meet the demands of modern traffic, there are five ancient gateways only broad enough to accommodate one vehicle at a time. Within the walls are very narrow streets with old stone buildings completely filling every block save for an occasional yard where the enormous fronds of palms hang over the iron railing. Many windows are barred by curious cage-like grills of ornamental iron and in these are often seen mestiza girls, chatting with friends or lovers on the walk outside.

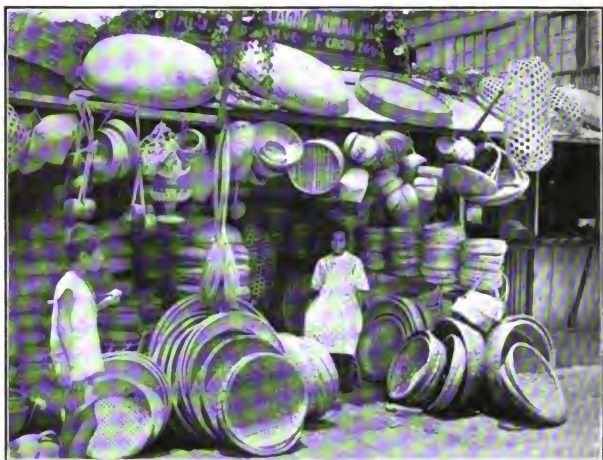
The almost inordinate influence of the ecclesiastical in the civilizations that Spain has planted in many parts of the world, is well exemplified in Manila. Manila abounds with ancient Catholic Churches and the Walled City is fairly congested with them.

Dominican, Augustian, Franciscan, Jesuit, Carmelite—all the orders are represented, each with its church, its chapels, its convent, its school and in two instances with large colleges attached. Indeed it seems that one meets a church or convent at almost every turn in *Intramurus*. One who browses around the more ancient churches and convents under the guidance of a kindly priest, will see quaint nooks, moss-grown cloisters, wonderful old hand-carved furniture in solid ebony, sacred vestments heavy with gold and silver, ancient parchment books too heavy to lift, interesting old paintings of the martyrs, and the large comfortable quarters of the *padres* themselves—things indeed that few Americans see or are even aware of.

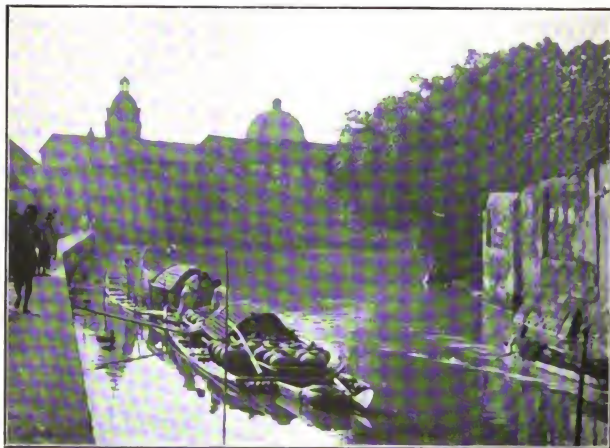
The native life of Manila is best seen along its crowded waterways. Lashed to the concrete walls of the Pasig River the steamers, barges, launches, and *cascos* are abreast in tiers seven and eight deep. Not only does all the inter-island shipping discharge its freight along the river quay, but the deep draught foreign shipping which anchors in the other harbor, transfers its cargo by lighter, up the river, to the warehouses along its walls. Old Fort Santiago juts into the river and holds from use a valuable piece of water front. Under its walls the *lorchas* and sailing craft have their allotted anchorage at a point where clumsy *bancas* crawl from shore to shore, transferring passengers for the price of a penny, for there are no bridges till one goes up past this hubbub of commerce to the Bridge of Spain.

But the waterways of Manila are not limited to the bay, the harbor and the river, for the whole of the city and the adjacent country round about is traversed by narrow tidal estuaries or canals known as *esteros*. The exploration of these *esteros* in a native canoe or *banca* is an interesting and lazy occupation not known to the tourist. The *bancas* are shaped from a single tree and one should select a light one with a bit of a roof—not omitting to take along a few pillows.

Up the river we pass squat untidy-looking steamboats, powerful things with twin screws to fight the current in some of the swifter reaches. The steamers slow down in mid stream and enormous dugouts put out from shore to meet them and transfer native passengers. On leaving the river and meandering through some tortuous *estero*, we pass *bancas* with various picturesque loads such as hay,



A MANILA BASKET SHOP.



"In an angle under the buildings of an ancient church are small cascos loading with cocoanut oil in fine brown jars."

bananas and gaily dressed women. Returning towards the city by way of one of these esteros the water traffic thickens. Cascos with grotesque color designs fore and aft, and with bulging loads of hemp, lumber, or fruit, contract the way as we slip by. Here, in an angle under the buildings of an ancient church, are some small cascocs loading with cocoanut oil in fine brown jars and on turning the corner quite as likely as not we will bump into a strange raft made entirely of cocoanuts, several thousand of them tied together in a circular form with one man gingerly poling it along. A pair of great eyes and nostrils peeps above the water and gives us a sudden fright as of crocodiles; they sink in a gurgling eddy and after a moment the monster reappears on the other side, splashing in the miry shallows—only a carabao, the water buffalo. In the city they are not so timid as when encountered far afield, for whole herds of them submerge themselves under the busiest bridges.

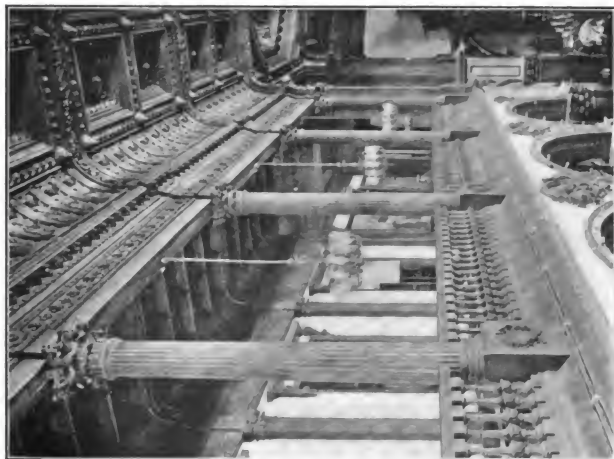
The congestion reaches a climax at the markets, and at one of these we leave the banca and pick our way through the rabble to the stalls, all sanitary on their concrete pavements and under a steel framed roof. Such pandemonium! such piles of produce! such smells! It is at once evident that the Filipino is a fish-eating race. The slimy silvery fish are better to look upon than the wares of the butcher and here one begins to see why the artist has a leaning to fish in still life. And then the poultry, all alive and confined in big open work baskets. The Filipino is strong on baskets, most of them of beautiful shape and some of immense size. A couple of hundred feet of stall will be given over to bananas, a dozen varieties, all hung up in a phalanx of yellow and green. The wholesome papaya and big baskets of smooth round, yellow, delicious mangoes, as luscious as any fruit the world over—these are the fruits that catch the eye.

Resuming our journey on the canal, the banks after a time are lined with a succession of little native bamboo houses. Then more rice fields and then the open bay. We are north of the mouth of the Pasig where the entire beach is one unbroken line of humble huts. Far to the south, beyond the river mouth, the big hulks of ocean-going vessels loom up from the deep water harbor behind the long white breakwater, and with their masts and derrick booms bristling upwards they look like nothing so much as big black roaches

that have tasted poison and turned over. But on our side of the river everything is native, nothing modern, not even the merest dock on the whole sweep of beach. The prows of big log-carved fishing boats stick out between the bamboo shacks, fishing nets are everywhere spread out to dry and the beach is used as a primitive rope walk where children are actually twisting rope out of raw hemp. Off on the mud flats other children are digging for shell fish and in the background along the shore, looms the ever-present church.

A description of Manila would hardly be complete without mention of the annual carnival, an institution introduced by the Americans and which has just seen its fifth year. For eight days and nights in February, and particularly the nights, King Carnival reigns supreme and everybody who knows how forgets dull care and revels in fun and merrymaking. The large military ground known as Wallace Field is entirely enclosed and within are erected various temporary structures and places of amusement similar to those at our amusement parks in the United States. There is an amphitheatre seating ten thousand where a hippodrome holds forth each day. This consists of athletic contests and military maneuvers for the most part, with the storming and burning of a city at the finish, accompanied by the booming of artillery and the incessant display of fireworks. On raised thrones sit the kings and queens of the Orient and of the Occident: the former chosen from among our dusky Filipino brethren and sisters and the latter from among the Americans. Outside the hippodrome are many pavilions, booths, restaurants, sideshows, shops, merry-go-rounds, a human roulette wheel and an immense dancing hall where three masked balls are held, one for a half peso, one for two pesos, and one for twenty pesos, this last intended to be very select of course. Every night the Bundoc or main street of the grounds is packed with a crowd of masked and costumed figures and it is here that the greatest fun is to be found.

Early in the evenings during carnival week all parts of the city are thronged with grotesquely costumed figures making their way towards the grounds, on foot, in automobiles, in the trolleys, and in countless carromatas. Even the most dignified deign to parade the streets in gala attire, made possible for many no doubt by the



THE JESUIT CHURCH. The carving is hand work in molave, a wood resembling mahogany.



A CASCO WITH TWO OF THE FAMILY. The family apartment is over the immense rudder.

easement of the mask which also is some help in forgetting race distinctions. Even the stolid Chinaman lets himself out and throws confetti at the American belles with as much freedom as good will. Of course American belles are somewhat lacking over here and they are naturally the centers of the greatest storms of confetti. On one evening the local papers may report that the grounds are filled to overflowing, on another there is a vast concourse, on another a great multitude of people, on still another it is reported that the field is a seething mass of humanity and on another thirty thousand souls are present.

Clowns and buffoons ply their drolleries cheek by jowl with nuns and priests, drunken soldiers drum out a rat-a-tat on the paunches of fat friars, and small-footed dudes of doubtful sex pirouette with large raw-boned Gibson girls of like uncertainty. Anon the crowd gives way for a band of red imps, betailed and behorned, bent on rushing some unsuspecting hobo; or it may be for the passage of a band playing a spirited march, or for a parade of human animals, grunting and howling to the jibes and thrusts from the closely packed funmakers. All kinds and colors of costumes are represented on all races, sexes, ages, and castes of people. There are grotesque costumes, funny costumes, beautiful costumes, and complex and simple costumes from the extravagantly moulded and painted pasteboard affairs covering the whole figure, to the merest little black mask across the eyes. There are angels and cherubs, pages and fairies, elves, goblins, trolls; geishas and mandarins; kings and queens; knights; soubrettes and jesters; troubadors and minstrels; toreadors, mendicants, tramps, weary willies, dancers, devils, kellow kids, Buster Browns, bathing girls, and many other unnamable rigs, all bent on being gay and silly, on seeing and being seen.

THE FIRST EXPEDITION TO MT. BLACKBURN.

DORA KEEN.

[This article was sent by Miss Keen from Chitina, Alaska, at the end of April, while she was on her second and successful expedition which reached the top of Mt. Blackburn on May 19, after thirteen days spent in caves on the side of the mountain beleaguered by a snow-storm. The present article is the author's revision of portions of the address delivered by her before our Society in January.—THE EDITORS.]

To try to climb a high mountain in Alaska is to combine the problems of mountain climbing with those of a short Arctic expedition. It resembles Arctic travel in distance from shelter and food, in lack of timber, and in perpetual difficulty of travel over ice and snow, with serious elements of danger due to changing weather conditions.

Alaska has about a dozen peaks above 14,000 ft., all of which are along the southwest coast or not far from it. Their southern sides are thus the easiest to reach, but their northern sides present the most gradual and perhaps the only slopes that can safely be ascended. Almost the only towns of southwest Alaska are on the coast, but they are far from the high mountains. Even the southern slopes of the high mountains are so far from any base of supplies that to reach even the foot of any one of them involves an expedition of the most difficult travel during from four days to four weeks. The limit of timber is found at 2,500 ft., and the snow line begins between 3,000 and 6,000 ft., according to the location and the season. Food, fuel and shelter have therefore to be taken, for almost the entire time that the expedition is to be out, in striking contrast to Alpine ascents, where only one night is spent out and that in a hut half way up the mountain, with civilization always within a day's reach.

Secondly, nearness to the Arctic Circle, combined with an unusual precipitation, a winter temperature of 30° to 60° below zero, and but five hours of daylight, give such a quantity of ice and snow that even a comparatively hot summer never leaves the high



CORDOVA HARBOR IN AUGUST.



1st day, 8 A. M.
LEAVING BLACKBURN ROAD HOUSE. Kennecott Glacier in background. Digitized by Google

mountains bare of snow as in other mountain regions. Intense and prolonged heat, such as that of last summer, made rock climbing in the Alps the easiest in many years, because it removes most of the snow, but it made the ascent of a high mountain in Alaska almost impossible; for on such great masses of snow and ice as those in Alaska, its effect is to cause the terrible avalanches of April, May, and June, to continue throughout the entire summer both day and night. Alaska's mountains do not require as steep and difficult climbing as do the Alps, but they are more dangerous and adventurous, for the problems are of crevasses and avalanches, of freezing or starving, far from civilization.

Mt. Blackburn, 16,140 ft., and latitude $61^{\circ} 44'$, is within 60 ft. of the highest of the Wrangell Mountains. The completion of the Copper River Railway, 196 miles long, from Cordova to the famous Bonanza Copper Mine of the Morgan-Guggenheim syndicate, in April, 1911, brought Mt. Blackburn to within 35 miles of civilization. I had gone to Alaska merely to see the wonderful scenery of the southwest coast, by boat and train, and because I wished to see the only remaining pioneer region of America. Knowing that I should find no Swiss guides in Alaska, I had no idea of doing any serious mountain climbing. Indeed, it was late in July that I first read of Mt. Blackburn, by chance, in a prospector's cabin, in the wilds of the Kenai Peninsula, where I was hunting for a big brown bear. There, in a Report of the United States Geological Survey, Mt. Blackburn was mentioned as never having been ascended, and as "worthy of the hardest mountaineer." Two wonderful weeks in the woods had taught me the quality of the Alaska prospector as a guide, and on my way back to Cordova I was fortunate in hearing of a man so experienced in Alaskan conditions and so reliable in every respect, that if I could get him to organize and lead an expedition for me, I was told, I could leave everything to him. I found him and he consented. He was Mr. R. F. McClellan, of Sawtelle, California, the ex-Superintendent of the Bonanza Mine at Kennecott. Familiar with the beautiful mountain from only 35 miles away and less, he believed that it could be climbed, and if at all in 10 or 12 days, including the approach and return by the Kennecott Glacier. To reach the base alone was thus to involve 35 miles of travel over crevasses, all the way from the railway. Three other

men, 2 pack horses, 3 dogs, and most of the supplies were secured at or near the starting point, which was the Blackburn Road House, mile 192 of the Copper River Railway, 4 miles below the mine. There was no time to secure the desired emergency rations, etc., from a distance, and all except my personal mountaineering equipment, which I had brought with me, had to be such as could be purchased or made either on the spot or in Cordova.

After many unavoidable delays, on August 15th, 1911, our little party started, leaving civilization at once, at an altitude of 1,500 ft. Within a few hours, at 2,500 ft., the last timber was left. A mining trail beside the Kennecott Glacier was followed to its end, about 10 miles. With difficulty the horses were led over an arm of the glacier, until at last we returned to dry land to camp the first night. From that point—still nearly 15 miles from the foot of the mountain—the horses were sent back the next day with an extra man who had come for that purpose, since beyond this point there was to be no grass for them.

From this point on, the supplies, weighing about 750 lbs., were packed on a dog-sled and pulled up the remaining half of the comparatively level Kennecott Glacier, another 15 miles or more, to the foot of the mountain. The hot summer had removed the snow covering and the contraction of the ice had opened the crevasses wide and deep. The ice was very rough and it was only with the hardest sort of effort on the part of all the men as well as the dogs that the foot of the mountain was reached in another two days—in four days from the railway, instead of in two days as expected. No one had ever tried to go even as far as the foot of this mountain before, so that it was partly pioneer exploration even to this point. The difficult and dangerous crevasses came every five to twenty minutes. They were often so wide and deep that the dogs were afraid to jump them and had to be thrown across. On the fourth morning, after a cold night camping on the ice, one man turned back, a German from Cordova who had asked to go and was an experienced Alpine climber. The four remaining men were Americans and had all been in Alaska off and on between seven and sixteen years. All had been prospectors and to the prospector mountain sides and glaciers are merely a part of the day's work. None of them had been above 10,000 ft., yet, in courage, endurance, ambi-



3d day, 3:30 P. M.
KENNECOTT GLACIER WHEN THE ICE WAS "GOOD." Raining.



5th day, 8 A. M.

MT. BLACKBURN, 16,140 FT., FROM BASE CAMP, 6,500 FT., AT HEAD OF KEMECOTT GLACIER. THE ROUTES TRIED WERE BY THE GLACIERS TO
right and left respectively.

tion, resourcefulness and consideration, they proved themselves superior to Swiss guides.

A near view of the mountain on this fourth morning, while still a day's distance from its base, had indeed made it appear to all of us in such a condition as to present no feasible way up. Never before had Mr. McClellan seen it so bare of snow. Still, on we pushed to its base. At 6,000 ft., at last, the glacier had a smooth snow covering, but our joy was brief, for in a blazing afternoon sun the snow was melting and merely concealed the dangerous crevasses. Because of the sled, to rope was not practicable. One dog went through, to be pulled out by his harness. All of us stepped into bottomless holes once or twice as far as the waist, saving ourselves just in time.

Arrived at our base camp, on rock-covered ice, where the sled must be left, 10,000 ft. of snow and ice had still to be climbed, by men carrying 70 lbs. and dogs 20 lbs. each. Instead of a week sufficing to go to the summit and back, as calculated in outfitting for 12 days, the next $4\frac{1}{2}$ days were wasted, trying in vain to chop a way safely up two different glaciers successively. Each of them in turn had to be abandoned as too dangerous, because of avalanches. The cliffs, caverns, blocks, and chasms of purest ice and snow on these glaciers were fantastic and beautiful beyond description. But it was not safe to be on such glaciers except during the frozen hours, from 3 to 9 A. M. Tons of ice were ready to fall on us as soon as the hot sun began to melt this frozen inferno, while underfoot there seemed only holes.

We used up our time, which to us signified our food and our fuel, on the crevasses of the approach and the avalanche-swept glaciers of the mountain. The avalanches defeated us. There was no safe course but to turn back, all the long way down the tedious Kennecott Glacier, just for lack of fuel and food.

The expedition did not succeed in reaching the top—owing to the abnormal heat and the storm—but it did find a possible route up the almost impossible southeast side, and the experience of thirteen days out on ice and snow was the most wonderful that I have ever had. To get to 8,700 ft. on Mt. Blackburn took as much effort and time as to make seven important ascents in the Alps the previous summer. It unfolded to view such limitless expanses of snow

and ice as to make the glaciers of the Alps and even the greater area of the Canadian Rocky Mountains by contrast sink into insignificance.

For scenery, Southwest Alaska stands paramount, while to see for one's self what the Alaska prospector is willing and able to undertake and to endure is to bring back a new standard of courage and a new inspiration for life.



9th day, 10:30 A. M.
NO WAY ASHORE FROM McCLELLAN GLACIER. Obligated to turn down.

HONDURAS.

SAMUEL MACCLINTOCK, PH.D.,

SOMETIME AMERICAN CONSUL, TEGUCIGALPA AND PUERTO CORTÉS, HONDURAS.

Location and Description.—It seems to be a general impression among us that Central America is a long way off and quite inaccessible. It certainly is unknown. There are few regions of any considerable size left in the world about which so little is known by the rest of the world as Central America. The remaking of geographical values which is constantly taking place is destined soon to make this fair region much better known to the people of the United States and the world in general. Now that we have become closely united to Mexico by commercial ties and our commercial and national interests are established in Panama, our connections with Central America and consequently our knowledge of those countries must needs grow rapidly.

As a matter of fact, the Central American republics are surprisingly close to the United States. Puerto Cortés, the principal port of Honduras,¹ on the north or east coast, is only nine hundred miles directly south of New Orleans. Honduras is thus closer to New Orleans than is Cincinnati. It is seven hundred miles closer to Chicago than is San Francisco. It is fifteen hundred miles closer to New York than is Seattle or Portland.

Central America is composed of five so-called^{*} Republics—Guatemala, San Salvador, Honduras, Nicaragua and Costa Rica. Together they make a region somewhat larger than New England, but containing only 5-6 million inhabitants—fewer than the State of New York.

The present republic of Honduras occupies the same territory as that occupied when it constituted a part of the kingdom or captain-generalcy of Guatemala, which was composed of the provinces of Guatemala, San Salvador, Honduras, Nicaragua and Costa

¹Spanish Honduras, not British, is, of course, meant here. The latter country, a British colony, lying just south of Yucatan, and therefore even closer to the United States than Spanish Honduras, is always preceded by the adjective.

Rica. Honduras is the central of the present five republics and the third in size. Owing to the bend which the continental tract makes at this point, Honduras lies between the Caribbean Sea on the north and the Pacific Ocean on the south, rather than on the east and west, respectively. On its northwest is Guatemala, lying just below Mexico. On its southwest is the little republic of San Salvador, and on the southeast, stretching nearly across its entire length, is Nicaragua. Situated thus, Honduras has not inaptly been called "The Buffer State."

Its northern coast line extends from the Guatemalan border on the northwest to Cape Gracias a Dios, at the mouth of the river Wanks, or Segovia, on the northeast frontier of Nicaragua. This gives it an east and west coast line of about four hundred statute miles. It is nearly shut off from the ocean on the south by San Salvador and Nicaragua, its frontage on the Bay of Fonseca being about sixty miles. The distance across country from ocean to ocean is only about 230 miles.

Honduras lies between 83° 20' and 88° 13' west longitude and 13° 10' and 16° north latitude. It is thus entirely within the torrid zone. The country contains approximately 45,000 square miles and is thus a little larger than Louisiana and about the same size as Pennsylvania. In form, it is almost quadrilateral with a perimeter of approximately 1,556 miles.

General Aspect.—Like the other parts of Central America, Honduras in its general topography and physical aspect presents a great variety of climate, products and resources. In general, it is a picturesque country. High mountain ranges, bare volcanic peaks, elevated tablelands, broad and fertile valleys, and extensive alluvial coasts, together with numerous mountain streams and lakes—the whole teeming with animal and vegetable life—make for the most part a diversified and rather attractive region.

The coastal plains vary in width from just a few miles to several times as many. The portion immediately adjacent to the sea is generally low, sandy and infertile. A little further back, the soil becomes deep and rich. While the coastal plains are nowhere covered with the rank, luxuriant vegetation characteristic of some portions of the tropics, nevertheless the growth is heavy, and often dense. Especially is this true of the Atlantic side, owing to the prevailing direction of the trade winds.



AMAPALA, THE CHIEF SEAPORT OF HONDURAS ON THE PACIFIC SIDE. It is situated on an island in a beautiful, protected bay and has about 2,000 inhabitants.



ON THE ROAD FROM AMAPALA, THE PACIFIC PORT, TO TEGUCIGALPA, THE CAPITAL, some 80 miles in the interior.

The interior is generally rough and broken, though containing many open savannas and park-like valleys. Here the general aspect of the country partakes of many features characteristic of the tropics and of the temperate zones alike, and may therefore best be characterized as semi-tropical. On the higher altitudes, that is, from 4,000 feet or more, oaks and pines prevail and the general impression is that of a temperate zone country.

Mountains.—In Central America the continental tract is narrow, irregular, and much indented, and for the most part, of volcanic nature. Only Guatemala and Honduras possess any considerable breadth. The two Cordilleras that pass through Mexico meet on the Isthmus of Tehauntepec and continue on south, forming in Guatemala a single broken tableland of considerable elevation, though lower than the plateau of Mexico.

It is low at the point where the Gulf of Honduras bites well into the land, then rises again into a somewhat formidable barrier along the Pacific coast, sending a number of transverse ranges into the interior of Honduras. Continuing on south, it passes through Nicaragua at a somewhat lower height, forming a large basin which contains the lakes of Nicaragua. When in Costa Rica, it rises again into a bold, rugged range, capped by the volcano of Cartago. It then becomes a series of low ridges, passing in this form through the Isthmus of Panama and uniting itself south of there with the great Andean system of South America.

In Honduras, many mountain spurs and ranges of hills radiate from this Cordillera which thus forms the backbone of the country. These little ranges do not maintain an unbroken character throughout, but at times seem to run around almost in a circle, and form interior basins of varying elevation, not inaptly called by the Spaniards "*bolsas*," or pockets. The center of these broken ranges seems to be filled with many cone-shaped hills and protuberances without any general plan of arrangement, suggesting, when looked down upon from an altitude above, bubbles that have hardened in a caldron after the fire beneath has gone out.

There are some volcanic peaks but these do not seem to have been in a state of eruption during the European occupation. Honduras, in this respect, and likewise in its comparative freedom from earthquakes, seems to be unique among the Central American countries.

As the traveler stands on the uplands of the interior, at an elevation of 3,000 feet or more, the view which he gets out over the streams, valleys, plateaus, and mountains, though hardly bold and rugged enough to be called grand, is certainly beautiful. Range after range of softly rounded mountains, green and wooded to the top, stretch away as far as the eye can see, swimming in the bluest of hazy atmospheres.

In the center of the republic lies the plain of Comayagua, the largest in the country. It extends some 40 miles from north to south and from 5 to 15 miles in width. On account of its low level, it forms a convenient break in the mountain range and thus forms the natural route for transportation between the north and south coasts. From the plain of Comayagua, the Humuya valley extends due north to the Bay of Honduras on the Atlantic Ocean, and thus includes the Sula plain, while south of the Comayagua plain stretches the valley of the Goascoran to the Bay of Fonseca, on the Pacific. This great transverse valley reaches from sea to sea, having an elevation of only 2,850 feet in its highest part.

Climate.—The general impression which people living in temperate zones have of the climate of the tropics is that such regions are dreadfully hot and oppressive. They imagine that if it is barely endurable during July and August in New York and Chicago, a country like Honduras, located well within the tropics, must indeed be unbearable. This is far from correct. Seldom does one experience, even on the coast of Honduras, days anything like as debilitating as those in the worst of our summer weather. The real objection to the weather in such a place as Honduras is not its intensity at any given time, but its continued sameness practically throughout the year.

It goes without saying that there is considerable climatic variation due to differences in altitude, prevailing direction of the winds and other local conditions. The land rises from the coasts by a series of terraces to an altitude of six thousand feet, and consequently with every grade of temperature from the severe heat of the coasts to the delightful warmth of perpetual spring in the highlands. In the upper altitudes, the temperature is never very high and the nights are severely cold, so that one or more blankets are a requisite to comfort. In some of the higher mountains, light showers of snow occasionally fall.

The seasons in Honduras should be distinguished rather as the rainy and the dry than as the hot and cold. In general, the rainy season commences in the month of May and lasts until November. On the Atlantic coast, however, the rain lasts much longer and the precipitation is consequently greater. This is due to the fact that the prevailing trade winds are from the northeast. They gradually lose most of their moisture by the time they pass over the mountains of the interior and consequently are comparatively dry when they reach the Pacific side. It has been calculated that the average rainfall at Tegucigalpa amounts to about 48 inches in the year. Even on the Atlantic coast the precipitation is less than half the quantity which falls in regions farther south, as, for example, in the Amazon Valley, where the yearly rainfall in some localities is said to reach 292 inches.

In Honduras the rain rarely falls in long-continued pours, but rather in short, hard showers. It frequently happens that days and even weeks pass in the so-called wet season without a drop, or at most only a passing shower, falling.

The naturally high temperature of this latitude is modified by the general elevation of the larger part of the country and the proximity to comparatively high mountains. The prevalence of pines and oaks throughout the country is an evidence that, though within the tropical zone, the climate of Honduras is not what we generally associate with tropical countries. The naturally high temperature of the coast regions does not obtain far inland, for even before the increased altitudes begin to have their effect, the influence of the neighboring mountains is felt. A number of observations as to the range in temperature have been made from time to time in various parts of the country, though with what accuracy it may be difficult to state. Nevertheless, they are presented as being the only evidence which we have.

The mean temperature throughout the year for the whole of Honduras has been stated to be about 74 degrees Fahrenheit. The extreme range is from 42 degrees, at the capital, in remarkably cold winters, to 97 degrees, on the coast, in exceptionally hot summers, an extreme range of 55 degrees. At Trujillo, on the Atlantic coast, the range is stated as being from 74 to 84. At Comayagua, in the interior, the following table indicates the observations taken:

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	6:00 A. M.	12:00 M.	3:00 P. M.	6:00 P. M.
April.....	75.7	81.9	84.0	80.2
May.....	75.5	81.2	80.3	78.5
June.....	74.4	78.5	80.8	78.3
	75.2	80.5	81.7	79.0

It is seen that the mean from 6 in the morning until 6 in the evening was 79 degrees. The highest point touched was 88, the lowest, 68—an extreme range of 20. Comayagua, being in the midst of a rather extensive plain, consequently has a higher temperature than most places in the interior. It is also to be borne in mind that April, May and June are the hottest months of the year, and that during December, January and February the temperature is considerably lower.

From the records of temperature kept at Tegucigalpa from 1892 to 1897, it appears that the highest and lowest points reached were 97 and 42 degrees F., respectively. The maximum and minimum temperatures at the capital during the year 1897 were stated as follows:

	Minimum.	Maximum.
Jan.	54	79
Feb.	52	84
Mch.	55	88
Apr.	56	89
May	63	90
June	65	86
July	64	84
Aug.	62	84
Sept.	61	84
Oct.	61	83
Nov.	61	82
Dec.	50	81

The following observations made at the mouth of the Black River, 120 miles east of Puerto Cortés, in the same latitude and on the same coast, for the year 1841, are given by Thomas Young in his "Narrative of a Residence on the Mosquito Shore": "The climate here is pretty equable, only varying throughout the year from 62 to 85 degrees F., so that nothing need be apprehended from excessive heat, especially as, during the greater part of the year, it is tempered by the grateful sea breeze, and sometimes by the in-

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A VIEW OF ONE OF THE PRINCIPAL STREETS OF TEGUCIGALPA, HONDURAS, SHOWING MEANS OF TRANSPORTATION.



VIEW OF THE CENTRAL PLAZA AND THE CATHEDRAL, TEGUCIGALPA, HONDURAS.

vigorating dry north wind." His observations showed the following monthly averages: January, 62 to 66; February, 66 to 70; March, 70 to 74; April, 74 to 76; May, 78; June, 78 to 82; July, 82; August, 84 to 86; September, 84 to 86; October, 78; November, 72; December, 62 to 66.

Another observation taken at Tegucigalpa in May, 1906, shows the lowest reading as 59, the highest, as 89, and the average, as 77. At Santa Rosa de Copan, with an altitude of 3,400 ft., the average is given as 71. Esperanza, with considerable higher altitude, was given an average of 62.

Healthfulness.—The real question, after all, which one wishes answered with regard to the climate of any particular country is that of its healthfulness. The popular opinion is that Central America is a particularly unsanitary region, a place not capable of becoming the permanent home of the white people coming from Europe and the United States. Honduras in particular has a hard reputation in this respect. It is generally thought not only to have more than its share of malarial fever, dysentery and other such diseases, but likewise of those scourges of the tropics—yellow fever and cholera. This reputation applies to practically the whole stretch of seacoast from Mexico to Panama. Indeed, Vera Cruz and Chagres have been called the "Graveyards of Europeans." Puerto Cortés has had more than one severe yellow fever epidemic within the last generation and might well be regarded as one of the most unhealthy ports in this part of the world.

It may well be doubted, however, whether Central America, as a whole, and particularly all those parts away from the seacoast, deserve any such reputation. Indeed, there are numerous observers, both native and foreign, who assure one that the climate of Central America, as a whole, is as equable, delightful and healthful as can be found in any part of the world. Indeed, some of the phrases which one hears with regard to the climate upon the uplands of this region would lead him to think that their authors must have had some ulterior motive for expressing themselves as they did, and it is a well-known fact that most of the writers upon Central America have had material interest there at stake. "In healthfulness, as in climate, the greater part of Honduras excels even the most favored states of the Union. Pure sea breezes, blowing almost constantly over hundreds of miles of ocean, act as a bracing tonic."

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So one writer tells us. Another one assures us that all testimony on the subject "concurs as to the undeniable salubrity of the central portion of Honduras and of Central America in general." Again, the chief engineer of the survey of the Honduras National Railroad tells us that central Honduras "is blessed with a climate as delightful as prevails on any part of the earth." Dr. W. R. Gillespie, writing in 1906, makes this statement with regard to Olancho, in the central part of Honduras: "The hills crowned with foliage, and the plains covered with deep grass, preserve a constant moisture in the earth. The trade winds, blowing at all seasons from the ocean, temper the air to a delightful mean. At Juticalpa, the mercury in the hottest weather of summer seldom rises above 95 degrees F. and my own thermometrical table, kept during the fall and winter seasons, never fell below 52 degrees, and only once rose above 82 degrees—the best medium for health and exercise. My observations of temperature were made daily, three times a day, from September 27th to January 15th. At six o'clock in the morning, observations made from December 16th to January 15th, showed an extreme variation of only 9 degrees, 52 degrees to 61 degrees. The noon observations for the same days showed the same variation, 72 to 80 degrees. The morning temperature at Lepaguare, for the winter season, was about 50 degrees; the noon, 78; the evening, about 74. It has never been known as hot at Juticalpa, during July and August, as is frequent at New York and New Orleans. The temperature of Lepaguare is probably finer and more equable than that of any other part of Central America. The reasons for this are geographical, and do not apply in general to the tropics. At Truxillo the heat is distressing and bilious fevers and dysentery are as common as in New Orleans, but not so fatal because of the better location of the place." Finally, the observations of a gentleman, writing of Omoa (six miles west of Puerto Cortés), in the *Journal des Debats*, conclude with this statement: "In short, throughout the coast, octogenarians are more common than in Belgium or France."

It is very evident that there is a great difference between the temperature and the general healthfulness of the coastal and the interior parts of Central America. The white population has never taken kindly to the lowlands in this region, whereas it seems to find no difficulty in maintaining at least a fair degree of physical and

mental health on the cooler uplands. Even the Indians seem always to have preferred the interior and western parts of these countries to the Atlantic side, and the early Spaniards did the same. All the capitals and other centers of population have been located on the uplands and near the Pacific. It is only the development of the banana industry in recent years that has caused the sleepy little villages along the Atlantic to become real places of growth and activity. A Chicago physician, who has likewise practiced in New York and Paris, now maintains a hospital and sanitarium at Tegucigalpa and feels confident that the pure, balmy and equable climate of that region will some day make it sought out by those suffering with bronchial and similar troubles.

Perhaps the most prevalent disease which one finds in the interior at the present time is that of dysentery. Mosquitoes are not really troublesome away from the coast and yellow fever in the same regions is unknown. The prevalence of mosquitoes and fevers in malignant form all along the Atlantic coast makes this region a very trying one upon men from northern climates. Nearly all such persons have intermittent and bilious fevers, and show unmistakable evidences of living under unsanitary conditions.

How much these conditions are inevitable and how much they are remedial is a question. Now that such wonders have been accomplished in Panama, which formerly was worse than any place found along the coast of Honduras today, the opinion seems to be entertained by medical men that it is simply a question of time until this whole region from Mexico to the Isthmus will be drained of its swamps, rid of its mosquitoes, cleaned of its rubbish and thereby made practically as healthful as our own gulf region. Our Government now maintains, as a part of its quarantine service, a marine hospital physician in each one of the principal ports, and the local governments are doing more and more each year to clean up their cities and thus remove the causes of contagious disease.

A TUNNELLED PEAK IN THE CANADIAN ROCKIES.

B. W. MITCHELL.

That any new geographical features should be found in fairly well-travelled districts of the Canadian Rockies, easily accessible from the main line of the Canadian Pacific Railway, seems almost incredible. Such, however, was our good fortune during the summer of 1910. For some time rumors had been coming to our ears from trappers and timber cruisers of a peak pierced by a great natural tunnel. It seemed to be a most elusive mountain: for while one tale located it in the Pincher Creek region near the Crow's Nest Pass, another placed it in the near vicinity of Banff, north of the railway, and still another to the south of it. The first fairly authentic word concerning the strange mountain came from Mr. Thomas Wilson, of Banff, reputed to be the discoverer of that now famous valley of wonders, the Yoho. We were outfitting in Banff for a trip to Mt. Assiniboine via the Simpson Summit route, and on learning the trail we should take, Mr. Wilson said that he had reason to believe that a tunnelled peak rose close along the trail, and might possibly be seen if we kept a careful lookout and were fortunate.

"A number of years ago," said he, "I was camped along the rim of the Healy Creek canyon on the slopes of Mt. Bourgeau. I was sitting idly looking at the mountains across the canyon, my eyes by the merest chance fixed upon a certain snow patch far up towards the summit. A cloud floated behind the mountain, and to my amazement I thought I saw it through the snow patch as it drifted by. This would prove that the supposed snow patch was a natural tunnel through the peak, unless my eyes deceived me. I believe, though, that I was not mistaken, but I have never been back to verify my belief."

The lure of the geographically new is most potent; and with our curiosity thoroughly aroused, we resolved to devote one day of the scant number at our disposal to a search for this strange freak of nature and, if we succeeded in finding it, to a first ascent. About twelve miles from Banff on our first day's march, we camped



WINDOW MOUNTAIN. Looking through window towards the Northwest.

as near the site of Wilson's observation point as his description enabled us to locate it. We swept the range with strong glasses, and at length after a search that extended fully two miles along the canyon rim we saw an unmistakable tunnel from sky to sky through a bare rocky peak opposite.

Early the next morning, August 11, 1910, Professor H. C. Petersen, Miss A. McCorkle and the writer, with Mr. S. J. Unwin, of Banff, guide, made the first ascent of the peak and took numerous photographs of the really extraordinary formation. The peak is not particularly difficult of ascent, though tedious and exhausting. The first thousand or twelve hundred feet is through alders and willows, bent downward by the winter snows, presenting to the climber obstacles similar to those made for a rat by the converging wires of a trap. To struggle up through such undergrowth is trying in the extreme to the muscles, to the patience, and in some instances to the vocabulary. Above the alders and willows there is a short stretch of solid footing and then an extensive slope of broken talus, as steep as talus can lie. This talus was exceedingly unstable; and often our movements, however carefully made, dislodged a cubic yard or so of the loose stone, and caused many twice-taken steps. The last couple of hundred feet are over almost vertical snow and cliff, the latter badly disintegrated and dangerous to climb. We were obliged to rope in pairs, the leader of each pair testing holds continually and discharging a veritable artillery fire of broken rock on his unfortunate follower who had no resource but to huddle close to the cliff and pray that some unusually large fragment would not strike head or hand. Finally we reached the tunnel which proved to be about sixty feet in diameter and the same in length, piercing the rocky cock's comb which formed the crest of the peak. The tunnel lies at an altitude of about 9,000 feet, about 400 feet below the actual summit.

The rock is yellowish limestone, and the evidences of great disintegration and tremendous downfalls seems to suggest that it was originally a cave, the back wall of which fell away in some cataclysm of the past. Such great falls of entire mountain sides are not unknown in these mountains. Perhaps the most startling example is the chaotic Gnome Valley, more prosaically known locally as Landslide Pass, near Mt. Assiniboine. Here an entire range has split in half longitudinally and lies in a wild confusion of boulders

from the size of a bushel measure to that of a cathedral, among which a tortuous trail must be picked for nearly six miles. The most recent instance is the collapse of a mountain side at Frank, where part of the little town was swept away with great loss of life. If, therefore, a cave should be situated in a cliff thus unstable, a downfall would cause exactly such a tunnel as has here been found.

The view from the tunnel, though magnificent on the Bourgeau side, was disappointing at the other opening, as the tunnel here opened on a vast glacier basin now entirely drained of ice, but walled in by a lofty peak which entirely cut off any distant vistas.

As the mountain was unnamed, we called it Window Mountain.

GEOGRAPHIC NEWS AND NOTES

INFLUENCE OF PHILIPPINE CLIMATE ON WHITE MEN.—In the December *Philippine Journal of Science*, Weston P. Chamberlain gives the results of observations carried on in the Islands among men in military service to determine the effect of complexion on health. Exact observations carried on for one year on large numbers of blonds and brunettes showed no constant or material differences for the two complexion types. The amount of sickness in the soldier group was larger among the blonds than the brunettes, but on the other hand, among the soldiers invalided home the brunettes were in much larger proportion. Physical examinations and laboratory tests failed to show any physiological distinctions at the end of the period of observation. Military conduct of the blonds appeared to be as good as the brunettes. The observations also show that the incidence of nervous diseases, which are commonly thought to be favored by tropical climates, during the past seven years has not been greater in the Philippines from that in the Army of the United States. On the whole the blonds seem fully as able as the brunettes to withstand Philippine service for a short period of time, at least.

THE PERUVIAN EXPEDITION OF 1912.—The Peruvian Expedition of 1912, organized under the auspices of Yale University and the National Geographic Society for the purpose of carrying on geographic and anthropological exploration in Peru, will endeavor to continue and extend the work of the Yale Peruvian Expedition of 1911, utilizing the discoveries made then and continuing further along the same lines.

It is the purpose to pursue intensive studies in the region where reconnaissance work was done on the last expedition, taking advantage of the discoveries then made to guide the plans for this year. The expedition will include a geologist, three topographers, an osteologist, a surgeon, and three assistants, in addition to the director, Dr. Bingham. The geology of the Cuzco basin is to be studied, topographic maps made, two meteorological stations are to be established, archeological and anthropological investigations will be made, and a study of diseases of the region will be begun.

Professor Ellsworth Huntington of Yale is spending part of this summer in California in the mountains of the Kings River County, making further measurements of the rate of growth of big trees, the purpose being to determine if periodic changes of climate are shown by varying rates of growth. Professor Huntington has constructed a machine for drilling horizontal cores

from standing trees, the object being to secure good sections of trees that have not yet been cut.

During the coming summer, according to *Daily Consular and Trade Reports*, the time of the express trains on the Trans-Siberian road will be considerably shortened. The time of the express trains from Moscow to Vladivostok will be 8 days 17 hours 35 minutes, and from Vladivostok to Moscow 8 days 11 hours 35 minutes; from St. Petersburg to Vladivostok, 9 days 2 hours, and from Vladivostok to St. Petersburg, 9 days 4 hours 40 minutes. The time of the ordinary passenger trains from Moscow to Vladivostok will be $12\frac{1}{2}$ days and from Vladivostok to Moscow $11\frac{1}{2}$ days. It is thought that by next year a further reduction in the running time of 24 hours will be made. The Minister of Ways and Communications hopes before many years to provide a 6-day train from Vladivostok to St. Petersburg.

"The Plateau of British East Africa and Its Inhabitants" is the subject of the leading article in the *Bulletin of the American Geographical Society* for May. It is by Professor George L. Collie, of Beloit College. Howard Palmer, Secretary of the American Alpine Club and one of the foremost authorities on the mountains of British Columbia, contributed to the April issue "Notes on the Exploration and the Geography of the Northern Selkirks."

Honduras is a country whose mineral resources are destined to be thoroughly explored and exploited in the near future, and "A Visit to the Department of Olancho, Honduras," by Consul Haeberle of Tegucigalpa is of timely interest in connection with the article by Ex-Consul MacClintock in this issue of our own BULLETIN. It is published in the *Bulletin of the Pan-American Union* for May.

The *Canal Record* of May 8 tabulates the cost of the Panama Canal to March 30, 1912. The figures of construction expenditure include administrative and general engineering expenses, but not "general items," sanitation, hospitals, or civil administration. The total constructive and engineering expenditure is given as \$144,600,134.07. To May 1 there had been a grand total of 168,486,884 cubic yards excavated, leaving 26,836,495 to be taken out.

In order to add to the educational value of our national parks, the United States Government has published tourist-travel maps of the Yosemite, Yellowstone, Glacier, Crater Lake, Sequoia and General Grant national parks. These maps are to be used in descriptive pamphlets of the parks. In addition to the descriptive articles, it is proposed to issue short pamphlets on each park for the benefit of the traveler. These folders will give general information

regarding the railroads serving the parks, methods of transportation within the parks, locations of hotels, camps, etc., with the authorized rates. The number of tourists visiting the national parks in 1911 was 93,000, an increase from 30,000 in 1906.

The tenth International Geographical Congress, the meeting of which was to have been held at Rome last October, is to be held at the same city beginning March 27, 1913. The meeting is planned in spring instead of the coming fall because of the Trans-Continental Geographical Excursion which is to take place this fall, leaving New York about August 23. This latter is held under the auspices of the American Geographical Society.

An interesting account of past glaciations in Australia is given by Walter Howchin in the May *Journal of Geology*. Three well-defined periods of glaciation have been found—Cambrian, Carboniferous and Pleistocene. In the oldest glaciation, beds of boulder clay are found, with maximum thickness of 1,500 feet, containing erratics and ice-scratched pebbles. The Permo-Carboniferous glaciation was the most important of the three glaciations. Here, in addition to beds of till and scratched boulders, glaciated surfaces have been found. "The old glacial topography and surface features have been largely preserved, to the present day, throughout hundreds of square miles of country." Truncated spurs in valleys, roche moutonnées, with stoss and plucked sides, all accurately preserved. The glaciation that occurred in Pleistocene times was limited to the southwest highlands. Here striated, U-shaped valleys, hanging valleys, etc., show mountain glaciation of considerable magnitude.

One of the most costly and comprehensive drainage projects for the reclamation of lands undertaken by any government in the world, and certainly the greatest enterprise of its kind in Mediterranean countries, has just been begun by the Egyptian Government, according to the *Daily Consular Reports*. It will make cultivable one million acres of fertile land in the delta of Lower Egypt and require an expenditure of about \$30,000,000, equally divided between drainage and irrigation. The land reclaimed, now practically worthless, will be brought under cotton cultivation and will be worth \$100,000,000. This huge work is conjectured to be but the first of a series of similar projects which will ultimately bring the entire delta under cotton cultivation. It involves the drainage of several lakes bordering on the Mediterranean.

BOOK NOTES AND REVIEWS

Fuller, Myron L. *The New Madrid Earthquake.* Washington, United States Geological Survey, 1912.

A hundred years have passed since the great earthquake in the central Mississippi Valley which began December 16, 1811. These earthquake shocks "have not been surpassed or even equaled for number, continuance of disturbance, area affected and severity by the more recent and better known shocks at Charleston and San Francisco." Occurring, however, in an area at that time sparsely inhabited, comparatively little has been written of it, and this account is the first systematic record of the event, based upon recent field work and a study of the few contemporary descriptions. Tradition and geologic evidence show that the New Madrid region has long and repeatedly been subject to earthquake shock. A recurrence of these shocks may be expected. The author concludes that the cause is faulting in the underlying Paleozoic rocks of the central Mississippi Valley. A geologic map, several diagrams and numerous illustrations accompany the report.

Société De Géographie De Finlande. *Atlas de Finlande,* 1910. Helsingfors, 1911.

This comprehensive atlas, issued by the Geographical Society of Finland, consists of three volumes, a large atlas containing 55 double page colored plates, and two volumes of explanatory text. Of the two volumes of text, Vol. I deals with physical features and climate; Vol. II with population and civilization. These explanatory volumes are fully illustrated with half tones and colored plates. The Atlas itself consists of one edition, but with titles and explanations in three languages, Finnish, Swedish and French. The text consists of three separate editions, one in each of the three languages. Both as regards comprehensiveness of treatment and excellence of map work, this atlas is of a very high order.

Chamberlain, J. F. and A. H. *Europe, A Supplementary Geography.* 256 pp. New York, The Macmillan Co., 1912.

This little volume is one in a series of school geographical readers on "The Continents and Their People." Fully and entertainingly illustrated from photographs and containing four colored maps, the book is most attractive in form. In style and subject matter it seems somewhat too matter-of-fact for best results among the pupils of the public schools. The attempt of the authors, however, to connect cause and consequence, to explain the reasons for things, is to be commended. The book is explanatory, not merely descriptive.

Porter, Robert P. *The Full Recognition of Japan.* Pp. x, 789. New York, Oxford University Press (American Branch), 1911. \$4.00.

This new and comprehensive work on Japan is a detailed account of the economic progress of the Japanese Empire to 1911. In a country where the growth is so rapid and changes are so frequent, as in Japan, books of only a few years ago are out of date. This large work brings information down to the middle of 1911 and is a story, not simply of economic growth, but of social, political, educational, military and literary advancement. As a handbook for the student of the Far East this book is most valuable because of the great variety of topics it treats and the liberal use of up-to-date and reliable facts and figures that are generously used. But it is more than a handbook. It is an explanation and interpretation of the progress of Japan as well; and of unusual value because the author's conclusions have the basic facts stated. They are not merely impressions of a hasty traveler, but the deductions of a careful and sympathetic observer.

The first six chapters are historical, tracing the national and economic development of Japan from early times down to the period of her "full recognition" in recent years as a power of the first class. Geographic influences are clearly recognized in this historical account. The next twenty chapters deal principally with what might be called the economic geography of Japan—physical characteristics, population, resources, trade, etc. Chapters on the army and navy, education, municipal progress, etc., are also found in this group of chapters.

Nine chapters are devoted to social and art conditions while the closing chapters take up the colonial possessions—Korea, Formosa, Saghalin, Hokkaido, Manchuria. The book is well illustrated with maps; its style is clear and most readable; it is well indexed. Altogether it is the most satisfactory work on Japan as a whole that has yet appeared.

Hobbs, William Herbert. *Earth Features and their Meaning.* Pp. xxxix, 506. New York, The Macmillan Co., 1912. \$3.00 net.

How often does the traveller in his own country or abroad prepare himself for his journeys by a study of the physical features of the region he intends to visit? He will read up in preparation its history, its peoples, its architecture, but the far more ancient and often more fascinating story of its physical geography will remain for him an unopened and unknown book. When people have once learned the charm and fascination that is to be had from observations of land forms; when they once appreciate the added interest that is to be had from every journey where, from the car windows, new earth features or interesting illustrations of old ones are constantly coming to their attention, relieving the monotony of otherwise tiresome journeys; when they find that every walk and climb takes on a new and exhilarating interest; then will even the ordinary traveller pay more attention to a study of the earth itself and will supplement his Baedeker with an account of the geologic history of the lands he visits.

This book by Professor Hobbs is written to serve as an introduction to the subject of physiographic geology for the general reader and student. Its illustrations are largely confined to northern North America and Europe and emphasis is placed on those features which are most common in those regions "well known to travellers and likely to be visited, either because of their historical interest or their purely scenic attractions." An appendix contains outline itineraries of journeys in Europe and America pointing out salient points of geographic interest.

As stated in the preface, the chapters of this book are the substance of a course of lectures to university students. The book is therefore a text-book, widely parting, however, from the ordinary text-book on geology. In that surface form is emphasized and geologic structure described chiefly to show how it has determined and affected these surface features, the book might better be termed an introduction to physiography rather than to geology. Historical geology is not treated at all. The appendix contains descriptions of laboratory work and models and descriptions of common minerals and works.

As to subject matter, it seems to the reviewer that too little space is given to stream erosion and that glaciation is over-emphasized. Nine chapters—140 pages—are given to the latter subject, while rivers and river action receive but two chapters—21 pages. The author attempts to justify this by the fact that most American and European colleges are in glaciated regions. Even so, this would not justify such a marked disproportion. Even in glaciated regions, normal stream erosion is the process now in operation and the earth features due to running water in pre-glacial times are the dominant ones even in the glaciated landscape. If glaciation deserves nine chapters, rivers certainly require more than two. The chapter on the life history of rivers is decidedly disappointing. The subject of "erosion cycle," for instance, is treated in one short paragraph, so compact in form and heavy in style that the beginner is almost sure to overlook its importance, or fail to appreciate its significance. This whole chapter needs amplification. Again in the chapter on "Repeating Patterns in the Earth Relief," the author confines the discussion to those relief features due to fracture lines, a favorite topic with the writer, and such trellised drainage patterns as those of the folded Appalachians of Pennsylvania are not mentioned.

The book is profusely illustrated with diagrams and half-tone plates. There is scarcely a page without an illustration. These add very materially to the value of the text. The book is a very valuable addition to works in this field, for both the student and the general reader, in acquainting them with the underlying principles that determine land forms and explain existing scenery. The non-scientific reader will find it an excellent introduction to the study of the earth and every person who travels at home or abroad should become acquainted with the principles it sets forth.

ACTIVITIES OF THE SOCIETY

EXPEDITION TO THE EVERGLADES OF FLORIDA.

Under the auspices of the Geographical Society of Philadelphia, a botanic and geographic expedition is being made this summer to southern Florida by Professor John W. Harshberger of the University of Pennsylvania. Professor Harshberger has made two previous trips to Florida and this expedition is to complete his studies in the Everglades region of the extreme southern part of the peninsula. The itinerary will be approximately as follows: Making Ft. Meyers on the west coast headquarters, Professor Harshberger will first investigate the region in that vicinity; visits will be made to several of the islands along the Gulf Coast; the Caloosahatche will be ascended by power boat to Lake Okeechobee and the flora of that inland lake will be studied. Then the attempt will be made (if the drainage canal has been sufficiently constructed) to cross the Everglades to Ft. Lauderdale on the east coast. As no botanical geographer has ever crossed the Everglades, unusual opportunities will be presented to study a region of great scientific interest. Photographs will be taken of the vegetation, the region will be mapped botanically, and a collection of the more interesting plants will be made. An abstract of the results of this expedition will be published in the October number of the BULLETIN OF THE GEOGRAPHICAL SOCIETY OF PHILADELPHIA.

THE PERUVIAN ANDES.

BY

PROFESSOR HIRAM BINGHAM.

Professor Hiram Bingham, of Yale University, addressed the Society on Wednesday evening, April 3, on the subject "Climbing and Exploration in the Peruvian Andes." The lecture was interspersed with touches of a dry and delightful humor, and admirably illustrated with colored lantern-slides. The object of the expedition was by no means the attainment of high altitudes, but Professor Bingham and his party in the ascent of Coropuna reached the summit of what is probably the third or fourth loftiest peak of South America. In the singularly picturesque Andean wilderness were discovered unusual and sometimes unique evidences of the advanced prehistoric civilization of the Incas, and their knowledge of architecture and of accurate masonry would appear from the remains of their various edifices to have been extraordinary. Photographs taken in situ, and of the objects as after-

wards excavated, were shown of the human and animal bones discovered in strata that must have been deposited 30,000 or 40,000 years ago. The address, delivered without manuscript or notes, was a running commentary on the graphic pictorial sequence, and was equally informative and entertaining.

THE TRANS-ANDEAN RAILWAY.

BY

MISS LAURA BELL.

Miss Laura Bell gave a most interesting address at the meeting of May 1, on her journey "From England to the United States, via the Trans-Andean Railway." The lecture was copiously illustrated with lantern-slides. Miss Bell, while admitting the magnitude and value of the great achievement of the United States at Panama, deplored the failure of our Government to compensate the republic of Colombia for the loss of its territory.

At this meeting occurred the annual election of officers. The result of the balloting was as follows: *President*, Mr. Henry G. Bryant; *First Vice-President*, Dr. Theodore LeBoutillier; *Second Vice-President*, Miss Laura Bell; *Recording Secretary*, Dr. J. E. Burnett Buckenham; *Corresponding Secretary*, Dr. Paul J. Sartain; *Treasurer*, Mr. William K. Haupt; *Directors*, Miss Dora Keen, Mr. Edwin F. Keen, Mr. John B. Newkirk, Mr. William C. Pollock, Jr., Dr. Henry Skinner, Mr. Samuel Woodward; *Excursion Committee*, Miss Rachael P. Barker, Mr. F. Norman Dixon, Dr. Ruth Harvey, Miss Mary S. Holmes; *Reception Committee*, Mrs. Matthew James Grier, Mrs. Theodore LeBoutillier, Mrs. J. Bertram Lippincott, Dr. Anna Sharpless.

INTER-MONTHLY MEETING.

The last of the inter-monthly meetings for the year was that of Saturday afternoon, April 20, when Mrs. J. Edwards Woodbridge gave a picturesque account, with the aid of lantern-slides, of "Coronation Days in England." Tea was afterwards served in the library under the auspices of the Reception Committee, of which Miss Laura Bell throughout the year has been the chairman.

EXCURSIONS.

A walk was taken on Saturday, May 11, from the Jenkintown Toll Gate to the "Children's Village" of the Seybert Institute. A coaching trip was arranged for Saturday, May 25, and a very successful Memorial Day excursion was conducted to Brown's Mills, with dinner at the White House at mid-day and tea at five o'clock.

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MR. BRYANT'S LABRADOR EXPLORATION.

Henry G. Bryant, president of our society, started on Saturday, June 22, on an exploring expedition to unknown Labrador. Mr. Bryant has been to Labrador twice before, on the first occasion reaching the Grand Falls of the Labrador, on the second occasion exploring the coastal region. Mr. Bryant was accompanied by Russell W. Porter as topographer. In an interview shortly before his departure Mr. Bryant said:

"I shall pick up on the way two Newfoundland men to act as canoe men and some Labrador Indians. I hope to explore a portion of southeastern Labrador, mainly along the St. Augustine River, which I hope to trace to its source for the first time. I also hope to go over the Labrador plateau, which rises to a height of between 2000 and 2500 feet above sea level. A part of this plateau has been explored, but not all of it.

"I shall enter the St. Augustine River where it flows into the north shore of the Gulf of St. Lawrence, and hope to find that the river will take me down to the waters of Hamilton Inlet, a large indentation of the Atlantic coast, which runs into the country a distance of about ninety miles. Thus I hope to come into it or to a river which leads to it."

MISS KEEN'S MT. BLACKBURN EXPEDITION.

A letter received from Miss Dora Keen on June 21 by Justice Harrington Putnam, of Brooklyn, president of the American Alpine Club, says:

"MC CARTHY, ALASKA,

"June 8, 1912.

"My dear Judge Putnam:

"Your recent telegram on behalf of the Alpine Club gave me the greatest pleasure. It was a long, steady pull to get to the top of Mt. Blackburn, not difficult climbing, but difficult going, and so dangerous that there had to be constant change of plans to suit conditions and to accommodate success to disaffection on the part of my very independent men. I started with seven men and nine dogs, dragging about 2,000 pounds on eight sleds, and ended with two men dragging 600 pounds on two sleds. One dog left the second day, three men the thirteenth day with two dogs, and two more men with the other six dogs on the nineteenth day. It took thirty-three days, because of being just too late in the season, and as it was we should very likely not have escaped either an avalanche on the steep part or being swallowed up in one of the many crevasses that were opening all about our 8,700-foot camp on the way down.

"Our route was up Barrett Glacier, the same bad one that I tried last year. Part of it was a 76-degree slope in a gulch where ice cliffs broke off above on both sides all the time after 8 A. M., with snow finally so deep to break trail up that I could make only three inches headway at a time with one knee at a time. The load had to be hauled up on a sled consisting of snow-

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shoes, which were worn all the time when it was not too steep. The lateness of the season made the snow hardly crust up some nights, at least not before midnight, and by 5 A. M. the sun had melted it enough to cause difficulty and danger, too, of avalanches. We traveled entirely at night for the last week. Two slides swept over us, one at 2 A. M., but we had calculated our route rightly, rushed for shelter under an ice cliff, and got only an inch of snow spray. One bad avalanche went down one steep gulch just a few hours after we had come up it.

"I wish I could write more, but I am just leaving for a hunting trip and to write up Blackburn, traveling 100 miles to the White River through woods where for sixty miles we shall meet no one. At the river we shall whipsaw lumber, build a boat and float to the Yukon. Mail will reach me somewhere, via Cordova, if sent there, in a few weeks. I have splendid men.

"I owe everything to George W. Handy, of Cordova, a German, and I would be indebted to you if you would propose his name with me for the Alpine Club. His optimism, hard and intelligent work, good judgment, as well as his fearless disposition, got me up. He was the only one that went on top with me. We think it 17,500 feet high, but the aneroid got out of order somehow above 12,400, so it registered 23,000 feet on top, which it certainly was not. We had a fine view and found the Geological Survey map, on the whole, pretty correct.

"DORA KEEN."

THESSALY AND THE VALE OF TEMPE.

DR. WALTER WOODBURN HYDE,
University of Pennsylvania.

II.

We are indebted to Herodotus⁵¹ for an account of the first historical visit to Tempe, that of Xerxes. While his huge army was encamped around Therma,—the later Thessalonica at the head of the gulf which separates Pieria from Chalcidice—the Persian king, in looking southward down along the coast of the country which was so soon to humble his pride, let his eye rest on the magnificent mountain chain which culminates so grandly in Ossa and Olympus, with the defile of the Peneus between. When told that this huge rift—scarcely sixty miles away—was the gateway to Greece, he longed to see it, and so sailed with his fleet to the mouth of the glen. There he gazed up at the massive walls on both sides and “was struck with great amazement.” Wonderingly he asked his Thessalian guide if the course of the Peneus could not be diverted from its natural channel, perhaps wishing to emulate his father Darius, who had captured Babylon by diverting the Euphrates from its bed,⁵² or the great Cyrus, who had turned the river Gyndes into three hundred and sixty channels to chastise it for the drowning of one of his sacred white horses.⁵³ When he was told that this was the only exit for the whole Thessalian basin, and that it was only necessary for him to stop up this outlet with a mound of earth, in order to inundate the whole country and drown all its inhabitants, he thought he well understood why the princes of the Aleuadæ had been so eager to side with him. Nor was this an idle boast of Xerxes; for it is impossible to look out over Thessaly's plain and the formation of this exit, without seeing what would necessarily

⁵¹ Hdt., VII, 128 sq.

⁵² Hdt., I, 191. In saying it was Cyrus who took Babylon in this manner [538 B. C.], Herodotus is confusing two events, for it was really Darius somewhat later [521–19 B. C.].

⁵³ Hdt., I, 189.

happen, if the exit were closed. The ensuing inundation would first cover the eastern Pelasgian plain, and if the obstruction were high enough, the western half of the country—the Pharsalian plain—would also become engulfed as far as the Pindus. Then the outlet would probably be between Ossa and Pelion, over the pass of Melibœa, as the watershed southward toward Volo is somewhat higher; and the only part of the interior above water would be the irregular low range of hills extending between Velestino and Trikkalá, which partly separate the eastern and western halves of the country. In antiquity Thessaly was often subject to disastrous floods. Maximus⁵⁴ says the country suffers from floods just as Attica does from plagues or Sparta from earthquakes. The eastern part of the country suffers from them even yet. Near where the Titaresius enters the Peneus, there is nowadays a periodic overflow of water, first into lake Nessonis and then into lake Bœbeis. These two lakes “together with the Peneus and its tributaries,” are as Strabo⁵⁵ said, all that remain of this prehistoric inland sea.

It would seem then from the peculiar contour of the country that Tempe must be a pass of great strategic importance. Herodotus⁵⁶ relates that the Thessalians, learning that Xerxes was already on the march, sent messengers to the Greeks assembled in council at Corinth, and asked that troops be sent to Tempe to protect their country, or that otherwise they would be compelled to go over to the side of the invaders. So ten thousand men were actually sent under the command of Euœnetus the Spartan and Themistocles the Athenian, and they, being reinforced by Thessalonian cavalry, took up their stand at the entrance of the pass. But they soon learned from the friendly Alexander, king of Macedon, that there was another pass from upper Macedonia into Thessaly to the west of Olympus, entering the plain near Gonnus⁵⁷ through the country of

⁵⁴ *Dissertationes*, p. 285.

⁵⁵ 9, 5, 2. Strabo says Nessonis is larger than Boebeis; it is the other way now.

⁵⁶ VII, 172-3.

⁵⁷ Xerxes probably entered Thessaly by the Pass of Volustana leading over the Cambunians some distance to the west of Olympus. The Pass of Petra (the ancient Pythium), close under the northwest shoulder of Olympus, was probably too narrow. Both debouch into the valley of the Titaresius and so enter the plain to the north of Larissa and not at Gonnus as Herodotus mistakenly says.

the Perrhæbi. So they abandoned their position and moved down to Thermopylæ. It was over this rugged route, where a third of his army, during the long halt around Therma, had been engaged for three months felling trees and making the mountain pass into a military road, that Xerxes did lead his army into Greece. Doubtless the Greeks were fearful lest his fleet would land troops in their rear, either by the Pass of Melibœa or by the Pagasæan Gulf. In any case it is clear that Xerxes had no intention of passing his host along the narrow road—if road it could then have been called—through the gorge of Tempe. So the vale had little or no strategic importance at the time of his invasion. In the time of Alexander the Great, it had some importance. On coming to the throne (336 B. C.), he immediately turned his attention to the rebellious Greeks. Advancing on Tempe he found it was held by the Thessalians, and so he led his army further south along the Magnesian coast and made his way over the side of Ossa—probably to the north of the pass of Melibœa—and descended into the Peneus valley behind the Greeks. But it was not until long after the foundation of the Macedonian empire, well after the time of Alexander, that Tempe had any great strategic importance. In the Roman wars, the Macedonian kings added to the natural difficulties of the pass by building forts and a military road along its course. So the Roman consul Paullus, who defeated Perseus, the last of the Macedonian princes, in 168 B. C., was forced to use another route into Pieria, being unable to take the well-guarded pass. These castles and the road were kept in repair later by the Romans, so that finally in the first century B. C., during the civil wars, Tempe became impregnable. In antiquity it was possible to pass through the rugged lower Olympus above the vale to the sea. Livy⁴⁴ recounts how in 169 B. C., the Roman consul Q. Marcius Philippus was forced to lead his army into Pieria by way of Lake Nezero (Palus Ascuris), as King Perseus had blocked all the regular passes. To-day there is a rocky footpath from the site of the old castle of Gonnus at the western extremity of the pass—by way of the village of Rhapsani, leading back of the precipices which form the northern wall of Tempe, over several heights to the sea. When the English traveller Hawkins visited this region in

⁴⁴ 44. 1-9; and cf. Polybius (who accompanied the expedition) 28, 11. For a discussion of the consul's route, see Leake, "North Greece," III, and Tozer, "Researches," II, app. 7.

1797, he found that this rocky trail was used in preference to the road through the vale. But nowadays the old road has been put into good condition, so that even carriages may drive over it. The boat line from the village of Tsagesi, at the far end of the pass, to Saloniki, makes Tempe now the favorite route through the mountains.

After driving somewhat over five hours from Larissa, we at length reach Babá, the tiny village at the very entrance to the vale. Here the outermost barriers of Ossa and Olympus are bent back on either side of the river in semi-circular fashion, enclosing beautiful glades, shaded by majestic plane and cypress trees. On the south side is Babá, and opposite, connected by a bridge, is Balamati. From this latter village one can walk a mile and a half up the river to Dereli, a town mostly inhabited by Turks and most picturesquely situated in a large semi-circular plain covered with gardens and vineyards, which, separated from the river by a strip of pine woods, extends back to the foothills of Olympus. A little east of here, on a triple-peaked hill, are some ruins which are generally identified with those of the fortress of Gonnus, though some authorities, as Leake and Tozer, have placed it at Lykóstomo, a village a little below Balamati, which gave to the vale its mediæval Greek name.⁵⁹ We remained in Babá for an hour, enjoying after our long dusty drive what refreshment the tiny khan could offer. Though a most disreputable looking hostelry with only two rooms, and with a dirt floor, it went—as the sign over the door informed us—by the high-sounding name of “Xenodocheion ta Tempe”—Hotel Tempe. As in all outlying Greek villages, we were soon surrounded by a friendly though too-curious crowd of townspeople, who stood and watched us as we sat in front of the door and sipped our “mastika” and ate our bit of “loukoumi.” They seemed quite satisfied with our answers to the inevitable questions “ἀπὸ ποῦ εἶσθε,” and “ποῦ πᾶτε,”—where are you from? and where are you going?

Before walking through the vale from Babá, most visitors first make the steep three quarters hour climb up the side of Ossa to the picturesquely situated village of Ambelakia. As you look up at it perched a thousand feet or more above you, it seems literally to hang on the mountain's side just within the mouth of the pass. It

⁵⁹ The name of the town “Lykóstomo” first occurs in Anna Comnena, *op. cit.* (1, 5).

occupies a little amphitheater formed by two ridges, the entire hollow and its sides being covered with vines—"ἀμπέλια"—which give to the town its beautiful name. Here and there are patches of oak and cypress and the twisted olive with its silver-gray foliage. If one has never seen the sacred tree of Athena, he has only to picture to himself the gnarled and rugged outline of the apple-tree with the leaves of the willow. Far above—all above the tiny town—is the giant summit of Kissavos towering thousands of feet higher and dominating all, its huge flanks partly covered with forests of oak. Formerly Ambelakia was located further down the slope, but was later removed to this almost inaccessible location, for security against the Turks; for twice these rocks were stormed by their enemies from the plain below. The prosperity of this once flourishing village is now gone forever, and it has been left literally high and dry by the modern busy world. Only a century ago it was in its prime, when it had a population of four thousand souls, though now it contains scarcely a fourth of this number. Dodwell, during his visit in 1801, counted no fewer than twenty-four factories. To-day there is none, the few inhabitants depending upon their vines and flocks for their livelihood. The chief business until well on into the last century, was the dyeing of cotton thread with the rich color known as Turkish red, the men working in the factories coloring, the women preparing and spinning it. This thread was then shipped overland, mostly to Austria and Hungary. But this prosperity was short-lived. Costly litigation among the several rival companies, and the failure of a Viennese bank, where the thrifty Ambelakiotes had placed their money, were the forerunners of ruin. Then the madder, which furnished the dye and which grew wild on the hills of Asia Minor, began to play out; and as it was crushed by horses and the rest of the work was done by old-fashioned hand methods, the spinning jennies of England and the chemical production of dyes finally killed the trade.⁹⁰ Many Germans, interested in the factories, used to live here, and both Dodwell and Leake speak of the inhabitants as being far above the other Greeks in culture, many having travelled, and being able to understand German.

⁹⁰ Cf. the book of F. Boulanger, "Ambelakia, ou les Associations des Municipalités Helleniques avec documents confirmatifs," Paris, 1875, for further particulars. Also Urquhart, "Spirit of the East."

M. Beaujour, the French consul at Saloniki, who visited the place in 1798, speaks of their great industry in the following flattering language: "In this village are unknown both the vices and cares engendered by idleness; the hearts of the inhabitants are pure and their faces serene." They affected European manners and customs like the insular Greeks, even wearing hats and coats, short trousers and stockings, a costume which seemed to have aroused the impatience of Dodwell, who called it a "disgusting deviation from the noble and picturesque dress of the country," meaning, of course, the "fustanella" or pleated kilt still worn by the Greek peasants. But these mountaineer dyers left an indelible influence on the whole business of dyeing, even the French dyers of Montpellier learning some of their methods.

It is curious how ancient industries often linger on in the same localities, or are revived centuries later. In antiquity, the shell dyeing of Melibœa, a town on the opposite side of Ossa along the Magnesian coast—one of the cities ruled over by Philoctetes—was famed, as these verses from Lucretius⁶¹ show.

" . . . Melibœaque fulgens

Purpura Thessalico concharum tincta colore."

But the loss of business prosperity could not rob Ambelakia of its most beautiful possession. For its Alpine surroundings and magnificent view make it one of the most attractive of Greek villages. Few views offer such marked contrasts as this. Opposite rise the gray cliffs of Olympus devoid of all habitation, towering above the wooded slopes just above the river, with the village of Rhapsani in plain view; below to the east extends the awful chasm of Tempe, in which the Peneus is slowly lost to view in the folds of the giant walls; directly beneath are the tiny glades around Babá and Balamati, with their detached groves of oak and pine and ilex; and to the west is visible a portion of the Larissæan plain, where the river, emerging from a tiny pass formed by the southern off-shoot of Mt. Titarus and the northern end of the height above the town of Mavrochori, flows between the green meadows of the two little plains of Utmanda and Dereli with their peaceful villages. It is a view where desolation and the sublime grandeur of nature are in close proximity to fertility and

⁶¹ "De Rerum Natura," II, 499-500: "The bright Melibœan purple dipped in the blood of the Thessalian shellfish."

the gentler moods of rural beauty. The view from further up, from the top of Kissavos out over Thessaly and the "isles that crown the Ægean deep," with the snow-capped peaks of Olympus seemingly so near in the clear atmosphere, must be grand indeed. But I fear that the Ambelakiotes are but little moved by this wonderful view; for whatever may be said of the old Greek feeling for scenery, the modern Greeks seem dull enough to all its beauties.

Every classical student has a lively notion of the ideal beauties of the Vale of Tempe, as they have been celebrated in both poetry and prose. Tempe among the Greeks soon became a synonym of romantic and ideal nature, which it has maintained in literature down to our time. The Roman poets, especially, sang its praises, and the name Tempe came to be given to any beautiful valley whose beauty depended upon the softer and gentler aspects of nature. So Cicero, in a letter to his friend Atticus,⁶² calls a valley near Reate in the country of the Sabines, through which the Velinus flows, Tempe, Ovid called the vale of the Helorus in Sicily "Tempe Heloria,"⁶³ and the same poet called the Vale of the Muses in Bœotia "Heliconia Tempe."⁶⁴ Hadrian's biographer Spartian, in describing the attraction of the emperor's wonderful villa at Tibur, says a gorge there was named Tempe. Suidas, the Greek lexicographer of the tenth century, records that the name is applicable to any wooded mountain glen, as it is in poetic fancy yet.

Besides the innumerable praises of Tempe's scenery found in the Greek and Latin poets, we have three prose descriptions of considerable length by Roman writers, which we will consider in our estimate of the classical notion of its beauties. The first, chronologically, is by Livy, and occurs in the forty-fourth book of his history, where he is describing the military operations of the Roman consul Quintus Marcus Philippus, against the Macedonian King Perseus. He says (ch. 6):

"Tempe is a defile difficult to pass, even if it is not made hostile through war. For besides the narrowness of the pass for five miles, where there is scarcely room for a loaded horse to pass, the rocks on either side are so abrupt that one can look down only with a feeling of giddiness of mind and eye. The roar and depth of the

⁶² IV, 15.

⁶³ Fasti, IV, 477.

⁶⁴ Am., I, 215.

river Peneus, flowing through the vale, also terrifies. This place, so strong by nature, was fortified by four military posts of the king, placed at intervals; one near Gonnus at the very entrance; another called Condylon is an impregnable fortress; the third near Lapathus, which they call Charax, and the fourth on the road itself, about midway where the glen is narrowest, which could easily be defended by ten men."

A little later, Pliny the elder, in his "Natural History," gives this short description (in Bk. 4, ch. 8):

"The Peneus, rising near Gomphi [a mistake, for it rises at the other end of the Pindus] is transparent beyond all other rivers. It flows down between Ossa and Olympus, after a course of five hundred stades through a wooded valley, and is navigable for half that distance. Its course for five miles is called Tempe. Its width is about a jugerum and a half [150 feet], and lines of gently sloping precipices raise themselves aloft on both the right bank and the left. Within glides the Peneus with its emerald hue, green with its pebbly bottom and beautiful turf-covered banks, and withal melodious with the music of birds."

But our greatest expectations are aroused by the long and rhetorical description of Ælian found in the "*Παικίλη Ἱστορία*," that curious collection of miscellaneous subjects composed in the second century A. D. He says (Bk. 3, ch. 1):

"Tempe is a place between Olympus and Ossa. These are very lofty mountains, divided as though by some divine agency and enclosing in their midst a vale whose length is forty stades and whose breadth in some places measures a plethrum [101 feet], in others a trifle more. Through it flows a river called Peneus, into which other rivers flow adding their waters and enlarging it. This place contains many beautiful recesses of all kinds, not the works of human hands, but the spontaneous gifts of nature, conferred when first it received its form. For copious and thick ivy blooms and buds here and twines up the tall trees like noble vines, and grows into them, while much bindweed⁶⁶ runs up the hill-sides and covers the rocks. And the rock is hidden and everything is green, delightful to see. In these soft low-lying places there are many groves and recesses, which in the summer's heat form refreshing resting places

⁶⁶ *σμιλαξ*, "bineweed" or "black bryony" (Sandys).



INTERIOR VALE (LOOKING EAST FROM ENTRANCE).



INTERIOR VALE (LOOKING EAST NEAR EXIT) (ANOTHER VIEW).

for travellers. Many fountains and springs of cold water bubble up and are most agreeable for drinking. They say their waters benefit those who bathe in them, and bring them health. Birds everywhere, especially those noted for their melody, afford great delight to the ear, and by their singing they help to make the traveller's way unwearied and agreeable, diminishing his fatigue. On both sides of the river are the above mentioned retreats, spots well fitted for repose. Through the midst of Tempe glides the Peneus, sluggish and slow like oil; above it is thick shade from the outspreading branches of the trees along its banks, which keep off the sun's rays most of the day and allow those who use the river to sail along in coolness. The whole neighboring people assembles here, performing sacrifices, and holding social parties and symposia. And since so many are continually sacrificing, it results that most savory odors follow those who walk or sail through. This constant adoration of the god makes the whole place sacred. Here—so say the Thessalians—Pythian Apollo was purified at the command of Zeus, after he had slain with his arrows the serpent Python which once guarded Delphi—Gé having given the oracular response. He, crowned then with the laurel which grows in Tempe, and with a branch of the same leaves in his right hand, returned—it is said—to Delphi and there this son of Zeus and Leto forcibly seized upon the shrine. There is also an altar in the place where he was crowned and whence he plucked the laurel branch. Still, even now, the Delphians every ninth year send thither a company of noble youths, one of them being named embassy-chief. When they have arrived and have offered a magnificent sacrifice inside Tempe, they return, having woven crowns of the same laurel with which the god was formerly crowned. They follow the so-called Pythian way, which leads through Thessaly, Pelasgia, Cæta and the Ænian country, and through that of the Malians, Dorians and Western Locrians. The Delphians send them forth to Tempe with no less honor and reverence than the Hyperboreans venerate those who sacrifice victims in honor of the same god. Also crowns of this laurel are given to the victors at the Pythian games."

Thus was Tempe brought into connection with the cult of Apollo, and the late myth⁶⁶ of Apollo and Daphné had its setting here.

⁶⁶ Ovid, "Met.," I, 568 sq.

Daphné—the evergreen laurel tree—according to one version, was the lovely daughter of the river-god Peneus and was pursued by the Archer-god who became enamored of her. When just on the point of being overtaken, she prayed to Gé for protection and was immediately metamorphosed into the bay-tree, ever afterwards the favorite tree of Apollo. The myth grew out of an older tree-cult and was intended to explain the presence of the laurel in Apollo's worship. The Daphnephoria, or embassy to Tempe, was—as Ælian says—kept up till very late times and when it arrived at the vale a festival was celebrated there in honor of Apollo Tempeites.

After Ælian we find only scattered references to Tempe in Roman literature. During the middle ages, Nicetas Choniates in his "Byzantine History," written shortly after 1200 A. D., gives a short description of the pass and its one narrow and difficult road. He—as Anna Commena before him—calls the Peneus by the name "Salabria," the Salamvria. The first traveller of modern times to describe the defile, seems to have been Pierre Gilles (Gyllius), the noted French naturalist who was born in 1490. In his work "*De Bosphoro Thracio*" (lib. 1) he very briefly describes his impressions of Tempe, calling the Peneus by its old name, and like Pliny, applying the epithet "*viridis*" to it. The English traveller Brown, the author of "*Journeys through the Netherlands, Germany, Hungary, Servia, etc.*," which appeared toward the close of the seventeenth century, seems to have been the next to describe the vale. A Frenchman, Paul Lucas, in his "*Voyage fait dans la Grèce*," a work appearing in 1719, described his visit to Tempe in the year 1705. About the middle of the same century, Pococke, the Englishman, visited Thessaly and later in 1783 the Swede Björnsthål⁶⁷ describes his visit. In 1795 Hawkins made an attempt to see the vale in the month of July, but was deterred by the heat. He said that "no English traveller can perambulate Greece with impunity in the months of July, August and September,"⁶⁸ though this is commonly enough done nowadays. Two years later he tried it again and spent six days at Ambelakia studying the contour of the pass. He was the first of a long line of English travellers who have left descrip-

⁶⁷ "*Briefe aus seinen ausländischen Reisen.*" Trans. into German by Groskurd. (Vol. I.)

⁶⁸ See his paper on Tempe in Walpole's *Memoirs relating to European and Asiatic Turkey*, 2d ed., 1818, p. 529 n.

tions of what they saw in Tempe; first Dodwell⁶⁹ in 1801 and again in 1805 and 1806, then Leake in the years 1806 and 1810 and later many others, as Hobhouse,⁷⁰ Clark,⁷¹ Holland,⁷² Turner,⁷³ Gell,⁷⁴ etc., besides many Frenchmen, Germans and Greeks. The best of the older descriptions of Tempe in English are those of Hawkins, Dodwell and especially Leake, whom Dr. Robinson, the noted Hebrew scholar, called the "model traveller" and whom Tozer, the geographer of Greece, says was the first to apply the principle "*ex pede Herculem*" to his observations. Of later accounts, that of Tozer,⁷⁵ who visited this region in 1865, is the best. In 1835 a German, Dr. Georg Kriegk, wrote a dissertation on the Vale entitled "*Das Thessalische Tempe*," and later in 1858 he collected many other facts about the Peneus in another, "*Über die Thessalische Ebene*," the two most important contributions to the subject.

Let us now see for ourselves what the actual scenery of Tempe is like and how far it agrees with the Græco-Roman conception of it as we see it reflected in classical literature and especially in the descriptions of the three Roman prose writers which we have translated above.

From Babá—on returning from the excursion to Ambelakia—we enter the mouth of the pass, which, during the Middle Ages and until recently was known to the Greeks as "*Lykóstomo*"—"Wolf's mouth." We follow the road, which here forms the one street of the village, and which is the old military way of the Romans, extending all the way from Larissa through the defile to the little village of Laspochori near its eastern end. Soon we pass a grove of plane-trees and far above us to the right, high on the side of Ossa, we see Ambelakia clinging to the cliff. We like to fancy that the altar of Apollo mentioned by Ælian stood somewhere in this the largest of the many glades formed by successive withdrawals of the mountain walls, here where the scenery is soft and gentle. In some such glade the Thessalians used to assemble for sacrifice and symposia and

⁶⁹ *Op. cit.*

⁷⁰ "*Journey through Albania, etc.*" 1813.

⁷¹ "*Travels in Various Countries of Europe*" (from 1810-1824).

⁷² "*Travels in the Ionian Islands, Albany, etc.*" 1815.

⁷³ In "*Memoirs Relating to European and Asiatic Turkey*," 1818.

⁷⁴ "*Itinerary of Greece*," 1819.

⁷⁵ In his "*Highlands of Turkey*," Vol. II, Ch. XX.

pleasure parties⁷⁶ Now the road begins to rise; it has been built at great labor over a rugged spur of Ossa, in places carried as high as thirty feet above the river. Here and there in the rock are still visible the ruts made by chariot wheels, proving that we are on the ancient way. Traces of Hellenic buttress walls to protect it from inundations, can still be seen beneath the road. Close below glides the river—perhaps averaging fifty yards in breadth in this part of the defile—now sluggish and silent enough, except where it is impeded by tiny rocky islets that give it a slightly eddying current, which in the winter might make it look somewhat impetuous. Its banks all along are embowered in “nodding planes” and willows, which grow to a great size and stretch their branches far out over the water, and the margins are tangled with vines and shrubs. Above on our right in wonderful grandeur rise the stupendous gray limestone cliffs of Ossa, beautifully tinted with pink, and here and there relieved by green patches of trees and vines whose clinging tendrils trail over the rock—a rugged though pleasing sight. Thus the road winds along through the folds of the rocky walls, affording occasional glimpses of the nearer heights of Olympus opposite, though the summits of neither Olympus nor Ossa are visible from within the pass. At times the walls recede and disclose at the foot of the cliffs on either side charming dells and copses, recalling the description of Ælian. But in general the rocky wall on the opposite side of the river is of much bolder character than the side we are on, not being so picturesquely diversified.

The lines of Catullus

“ . . . viridantia Tempe,
Tempe quæ silvæ cingunt super impendentes ”⁷⁷

and the beautiful verse from the Latin Anthology running

“ frondosis Tempe cinguntur Thessala silvis. ”⁷⁸

are still more or less true of this early part of the pass, for the vegetation in some places is very profuse, the woods on the opposite side being especially thick and reaching quite a distance up from the

⁷⁶ Cf. Ælian, *op cit.*, and Plutarch, “ de Musica.”

⁷⁷ From “ Epithalamium of Peleus and Thetis,” 285-6. “ Green Tempe, Tempe which overhanging forests surround.”

⁷⁸ 315, 3 (ed. Meyer): “ With leafy forests Thessalian Tempe is girt,”

river. The factories of Ambelakia helped to denude the sides of Ossa of their former verdure, as now only shrubs and dwarf oaks are conspicuous on this side. In these little glades and along the river banks, are to be seen in wild profusion, figs and olives, agnus castus, lentisk and pomegranates, oaks, ashes and many other trees, among which Apollo's Daphné—the laurus nobilis—is conspicuous. All sorts of shrubs are also here, yellow jasmine and rosemary, together with great masses of wild grape and clematis which reach far up the weather-stained and jagged cliffs. Ælian's ivy (κιστός) however is no longer here nor does the bindweed grow in the poetic manner he says. Theophrastus, in his "History of Plants"⁷⁹ has left us an account of all the various trees and plants which were once to be seen here and he specially mentions the poplar, plane and ash tree.

So we journey on for above two miles from Babá, till midway through the defile we come to a refreshing spring, which used to go by the poetic name of "Kryologon"—cold spring—until it was changed into the more prosaic "Vasilikó"—royal—in honor of a recent visit of King George. It bubbles forth just below the road at the river's edge and is shaded by planes whose great branches quite shut out the hot sun and make of it a place—to use Ælian's phrase—"most agreeable for drinking." Just here the pass broadens considerably and forms a little meadow on the right, while opposite, the cliffs of Olympus also recede, the mass of verdure below—firs and oaks—contrasting strongly with the sterile and shadowy precipices above—the most prominent feature of Tempe's scenery. Doubtless this is the prettiest part of the vale.

After another half-mile the walls of the defile, as if by some Titanic pressure, again contract. This is the beginning of the narrows, the "Bogaz" or straits, as the Turks called it,⁸⁰ which extend on to the end of the pass, forming a wild mountain glen whose sides rise steeply from the river bed. Just beyond the entrance, standing on the top of a magnificent rock far above the road—the Gibraltar of Tempe—which towers over the western side of a giant gorge in Ossa's side, we see the ruins of a mediæval fortress, which once commanded this part of the gorge. An almost unscalable rocky

⁷⁹ 4, 6.

⁸⁰ The name "Baba Boghazi" was also applied by the Turks to the whole pass. Cf. Leake, *op. cit.*

path, easily defensible, is seen zigzagging up the crags above, while below there is only room for road and river. In the face of the opposite cliffs of Olympus, which rise almost perpendicularly from the water's edge, we see several little caverns. Traces of mural paintings have been found in them, showing that they were once inhabited by hermits, in the times when the mediæval castle was fortified. In Leake's day, one of them was still used as a chapel to "Aghia Triada"—the Holy Trinity. The ruins of the cliff fortress are now called by the peasants "*τῆς ἁγίας τὸ κάστρο*"—the castle of the beautiful lady, doubtless in allusion to the story often recounted in the Romaic ballads,⁴¹ of how a band of Turks in ambush finally capture the castle of a Christian lady who leaps from the window to escape her fate. Close above the roadside are the ruins of still another fort. As a fortress must have stood somewhere on this commanding site in antiquity, these latter ruins have generally been identified with Livy's fourth castle, situated "on the road itself about midway where the glen is narrowest, which could easily be defended by ten men." Though the historian gives it no special name, it doubtless was known as the "Castle of Tempe." Later it must have fallen into decay, and then rebuilt in mediæval times, which would explain why it no longer shows traces of Greek masonry.

For the other three forts mentioned by Livy, different sites have been assigned; Gonnus, "*primo aditu*" has generally been placed on the hill near Dereli mentioned above; Condylon has been assumed to have stood on the north bank of the river, somewhere on the rocky path to Rhapsani and therefore a little north and east of Gonnus; Charax, which Livy says was near Lapathus, if this latter village was, as is generally supposed, on the north side a little to the east of the tiny lake Ascuris, may have been on a path which anciently led down through the rocks from Lapathus to the vale. But it is needless to say that all these sites, even that of Gonnus, are in dispute. But it would have been strange indeed if this commanding rock, just at the entrance to the narrows, had not been fortified in antiquity as in the middle ages.

We now follow the road into the Bogaz. The scenery now takes on a far less indulgent aspect than has more or less characterized it

⁴¹ Cf. Passow, Coll., No. 485, etc.

thus far, and becomes severe and grand in the extreme. The walls of Olympus and Ossa are here separated only by the river, the road in consequence being hewn out of the solid rock in places. The precipices opposite rise sheer from the river-bed and bar all passing on that side; a road there would have been impossible to construct except by tunnelling. The cliffs of Ossa above us on the right, though not so vertical, are even higher, rising sometimes to a height of fifteen hundred feet. Down below us in the narrow canyon flows the river, its breadth much contracted here, the distance between the rocky walls of the gorge hardly averaging a hundred yards. Here it is dark and gloomy, only bits of blue sky being visible. If we look forward toward the east, we soon lose sight of the river as it is lost in the windings of the rocks. Its banks even here in the narrowest part, are still shaded by trees, whose roots are often in the stream itself. But not even here in this gloomy gorge is the river a loud and roaring torrent terrifying the traveller; it glides on—even in December when Leake saw it—steadily and tranquilly. Ælian alone spoke of its true course, when he said it flowed like oil.

So the road along the cliff above the river continues. Perhaps a half mile from the mediæval ruin, at the narrowest point where the road ascends a little, is still to be seen on the face of the rock above us a Latin inscription roughly framed in a simple moulding—though it takes a deal of searching to find the large though scarcely legible letters. It was discovered in 1806 by Dr. Clarke and runs thus:—

L. CASSIUS LONGIN
PROCOS.
TEMPE MUNIVIT.

This Longinus appears to be the same legate whom Cæsar⁸² sent from Illyria into Thessaly, and who later joined him at Æginion (the present Kalabaka in northwestern Thessaly near the monasteries of Meteora), where the dictator arrived after capturing Pompey's stores in Dyrrachium. The inscription must refer to the improvement of the old way through Tempe, though some have referred it to defensive works erected by Longinus here. So some have placed Livy's fourth castle in this vicinity. Just opposite in the cliff is a tiny opening which some investigators have thought was

⁸² "Bellum Civile," III, 34.

the site of Charax. Near the inscription the road is scarcely a dozen feet in width—though elsewhere through the defile it measures from fifteen to twenty. Though so narrow, it was still wide enough for two chariots to pass, for marks still to be seen in the rock show that these vehicles were only five feet wide. So Livy's remark that there is scarcely room for a loaded horse to pass, is not true even of this the narrowest part of the road. It may be, however, that the road was different in its contour in the time of Polybius, from whose history Livy borrowed his account, and that the present width was the work of Longinus. Fine views up and down the gorge can be had from this point.

A quarter of a mile further the narrows widen again. The steep gray precipices now begin gradually to recede and are replaced again by gently sloping banks covered with dense verdure as at the entrance. This beautiful exit again recalls the gentle sylvan vale of the poets. Soon we come to another spring called Barlaam, doubtless named after the famous mediæval saint of that name. A tiny tavern nearby dispenses the customary meager refreshment of wine and bread, which we supplemented by what we had brought with us from Larissa, and also by some delicious musk-melons which the innkeeper furnished and which in Greece grow to a wonderful size and sweetness. Under the shade of some plane-trees near the river bank we sat and rested and enjoyed the view back into the glen. A little later we walked on a quarter of a mile further, where we crossed the Peneus by a high wooden bridge which bespoke the danger of high water—with a guard house at its other end; from there we ascended a little hill to get a view of the further course of the river. The mountain walls have now rapidly receded and opened out into a great plain with a grand view of the sea beyond. The Salamvria, now much broader and more sinuous, with its banks lined with trees, winds its way over a flat and marshy plain which, in the course of ages, it has itself formed. It must be a distance of five miles before it finally reaches the sea. In the spring of the year, after heavy rains, this plain is often covered with water, so that it is not much cultivated nor inhabited. About three fourths of a mile below us, we could see the little village of Laspochori—the name signifies "mud-town"—near the river, where it makes a great bend to the north before flowing on eastward again to the sea. It



INTERIOR VALE (LOOKING WEST).



NEAR WESTERN ENTRANCE OF VALE.

was in this little town—the ancient Homoloion⁸³—that sacrifices were anciently offered to Poseidon Petræus and games were held in honor of his generous act of cleaving the mountains apart and so draining Thessaly. There was no town visible at the river's mouth; but some miles to the south of it along the shore—perhaps twelve miles from where we stood—was the tiny village of Tsagesi, the terminus of the road through Tempe, important now merely because of its sailing facilities to Saloniki.

This fertile plain is—as Strabo says⁸⁴—the beginning of the Macedonian Pieria, which stretches far around Olympus to the north, green and park-like. Once it was famed in early Greek poetic legend as the home of the Thracian bards, those earliest Greek singers, from whose rhythmic chants in honor of the Olympian muses and Dionysus later grew the dactylic hexameter of the *Iliad*, that “stateliest measure ever moulded by the lips of man.” Here at Pimplea, the legendary Orpheus, the father of song, who could move trees and stones by the music of his lyre, was born. Here he established the Dionysiac mysteries and here the Muses lived. The earliest and most romantic legends had their setting here. In classical times it was a prosperous and populous district, but now, under the deadening rule of the Turks, it has become a solitude of fields and forests. From the little hilltop, the view out over the sapphire waters of the Ægean is indeed enchanting. Far out over the Gulf of Saloniki, some sixty miles away, is visible in the clear atmosphere the outline of the promontory of Canastræum, the eastern end of Pellene, which is the westernmost of the three peninsulas of Chalcidice, while the nearer sites of Potidæa and Olynthus can be made out.

How then, we may ask, does the scenery which we have viewed in Tempe, agree with the notion of it which we get from classical writers? We have seen that the predominant feature of it is characterized much more by savage grandeur, and even the elements of the sublime in nature, than by the sylvan delights and rural beauties pictured by the poets and especially by Ælian. His description, it may be said at once, is only a creation of his own imagination; the

⁸³ Cf. Strabo, 9, 5, 22, where Homolion (or Homole) is “near Ossa, at the exit of the Peneus from Tempe.”

⁸⁴ *Loc. cit.*

whole account is much more in harmony with the fancy of a poet than with the sober work of a historian. He is painting a highly colored picture of the delights of imaginary meadows and shady river-banks, of pleasant groves where the ivy trails over rocks and trees, and bubbling fountains gush forth, and where the air is full of the odors of aromatic plants and tuneful with the melodies of birds. To be sure, the traveller does find, in the earlier parts of the glen and towards its eastern end, soft and beautiful features, which might in some measure justify the renown of the poets; for here he sees picturesque walls of vine-fringed rocks, pleasant little glades opening out at the foot of the cliffs and a rare profusion of vegetation, with all the beauties of form and color and fragrance. Such features, if they told all, would indeed go far to explain the Tempe we know from the poets. But these are not the characteristic nor dominant features of the glen. For even in these portions of the defile are also those lofty cliffs, cold and sterile, with their jagged outlines and their sides torn and seamed by primæval torrents, and everywhere we are impressed with a sense of awe and grandeur. And then the real pass—the Bogaz—is not a vale at all, but only a wild and savage mountain gorge, where beauty and amenity yield to the sterner feelings of awe and danger—certainly not the poetic conception of Tempe.

The descriptions of Livy and Pliny, on the other hand, inadequate as they are, fall much more into harmony with the real nature of the place. Livy, alone of all ancient writers, gives us a true hint of the grandeur of the scenery, while the rest all dwell rather on its gentler aspects. His account is doubtless taken from the lost description of Polybius, who visited Thessaly in person; but the Roman historian has embellished what he has borrowed, as his picture of the dangers of the narrow road and of the terrifying aspect of the Peneus amply shows. His account of the river approaches the fanciful description which we find in Ovid,⁸⁸ where the Peneus "with foaming waves rolls on" and "with its spray besprinkles the tops of the woods and wearies with its roar places far from it." For nothing could be more placid nor tranquil than the river I saw in August. Indeed the quiet current of the Peneus is quite out of keeping with the wild and savage surroundings of the Bogaz. Though Livy rightly dwells on one feature of the pass—the steepness of the preci-

⁸⁸ "Met., I, 568-76.

pice walls—Pliny speaks of them as “gently sloping” (*leniter convexis iugis*), and his whole account shows poetic influence, as when he speaks of the emerald-hued river with its verdant banks and the music of birds. The beauty of the vale, even the severe grandeur of the Bogaz itself, if we could but dissociate from our minds the impressions made by the classical writers, and divest the spot of all its history and poetry, would, grand though the defile is, seem tame beside many another mountain gorge in Greece. The terrific gorge of the Ladon or that of the Acheron in Epirus, or even that of the Erasinos near the monasteries of Megaspelion in northern Arcadia, or that huge pass, the Langada, over the back of Taygetus between Sparta and Kalamata, are much grander and more stupendous sights. But it was never this feature of grandeur in the Thessalian glen which called forth the encomiums of the ancient poets, but rather the sylvan delights supposed to be there, beauties which are equally or far more true of many other portions of Greece, whose praises were never sung and which are far more Greek in the character of their scenery.

This brings us to the question of the poetic interpretation of nature in classical literature. Much has been written on this subject since Alexander von Humboldt laid the foundation for its study.⁶⁶ It has often enough been laid down as a principle that the love of nature for its own sake is a feeling of very modern growth, a development of northern romanticism, and so a fundamental distinction has been drawn between the classical attitude toward nature and our own. Schiller is often quoted as saying that Homer took no more delight in describing nature than in describing armor. Ruskin, perhaps more than anyone else, has been responsible for our current notions of classical landscape. In his “Modern Painters” (Ch. XIII) he says in part: “They (the Greeks) shrank with dread or hatred from all the ruggedness of lower nature—from the wrinkled forest bank and the jagged hill-crest and irregular inor-

⁶⁶ On the whole subject of the classical attitude toward nature, see the following works: Humboldt, “Kosmos,” II, 372 sq.; Clark, “Peloponnesus,” p. 118 sq.; Dean Stanley, “Greek Topography” in “Classical Museum,” Vol. I; Tozer, “Lectures on the Geography of Greece,” p. 173 sq.; Ruskin, “Modern Painters,” Vol. III, Ch. 13; Shairp, “Poetic Interpretation of Nature”; Palgrave, “Landscape in Poetry from Homer to Tennyson,” and the many German works on the subject, *e. g.*, those of Biese, Hense, Gerber, etc.

ganic storm of sky, looking to these for the most part as adverse powers, and taking pleasure only in such portions of the lower world as were at once conducive to the rest and health of the human frame and in harmony with the laws of its gentler beauty." In speaking of Homer's treatment of landscape, he also says: "As far as I recollect, without a single exception, every Homeric landscape intended to be beautiful, is composed of a fountain, a meadow or a shady grove."

Tozer likewise has denied to the Greeks of the classical age any admiration of scenery, when he said: "The engrossing character of city life, the fulness of enjoyment furnished by literature and the games, and the way in which man was regarded as the center of all things, left no room for the admiration of scenery."

But this difference of attitude—great as it may be—is seen to consist not so much in a fundamental difference in the content of what we call the beauties of nature, as in the subordinate and incidental part such descriptions always play as mere settings to other more human interests. Dickinson, in his recent penetrating book, has brought this out most clearly in these words: "Not that the Greeks were without a sense of what we call the beauties of nature, but that they treat them habitually, not as the center of interest, but as the background to human activity. The most beautiful descriptions of nature to be found in Greek poetry, occur, incidentally, only, in the choral odes introduced into their dramas; and among all their pictures of which we have any record there is not one that answers to the description of a landscape; the subject is always mythological or historical, and the representative of nature merely a setting for the main theme."⁸⁷ For the great interest of the Greeks was certainly the human one. But just because they constantly treated landscape not as the main interest, but as "the background to human life—the scenery to the play"—to quote from Palgrave—should not lead us to the belief that they were deficient in a sense of appreciation of the beauties of nature. We find in both *Iliad* and *Odyssey* many passages which incidentally characterize the varied charms of nature with true poetic feeling. Mountain, sea, forest, sky—all furnish subjects for beautiful similes in the *Iliad*, while in the *Odyssey*, with its tamer and more domestic interests, one has but to recall such striking descriptive touches as this of Calypso's cave: "And

⁸⁷ "The Greek View of Life," p. 193.

the nymph within was singing with a sweet voice as she fared before the loom and wove with a golden shuttle. And all around the cave there grew a blooming grove of alder and poplar and fragrant cypress; therein fluttering birds were roosting, owls and hawks and screaming seagulls fond of the sea; and lo! right there around the hollow cave trailed a luxuriant vine heavy with clusters; and four fountains orderly set were flowing with clear water, the one near to the other and each turned to its own course; round about them there bloomed soft meadows full of violets and parsley. There then even a god, if he chanced to come thither, would admire the sight and rejoice at heart;"⁸⁸ or the splendid picture of the rocky coast of Scheria, beginning thus: "But when he was within hearing distance of the shore, even then he heard the sea break against the reef; and the huge breakers crashed against the firm shore with a terrible roar and all was wrapped in the sea-spray, and there were neither harbors for ships nor roadsteads, but only jutting headlands and reefs and cliffs—even then the knees of Odysseus were weakened and his heart unnerved," etc.⁸⁹ Humboldt and many others have shown that all subsequent Greek literature is replete with a deep appreciation of nature's beauties. This feeling was even more developed among the Romans, an essentially country-loving people. Latin literature contains many a picture in praise of scenery. One is reminded at once of the many fine allusions in Lucretius as vivid as those of Homer, which show his intimate knowledge of nature. Even Catullus, so absorbed in love that he seems to have had but little appreciation for nature, could at times feel its power, as in those artless lines expressive of his feeling on returning home to Sirmio and beginning—

"Paene insularum, Sirmio, insularumque
Ocelle . . ."

which becomes full of meaning to every visitor to the charms of the Lago di Garda.⁹⁰ Vergil's description of Æneas' boat ascending the winding Tiber and gliding beneath the overhanging trees on the banks and cutting the forests reflected upon its surface—

"Et longos superant flexus ramisque teguntur
Arboribus, viridesque secant placido aequore silvas"⁹¹

⁸⁸ "Od.," V, 61 sq.

⁸⁹ "Od.," V, 400 sq.

⁹⁰ 31, 1-6.

⁹¹ Æn., VIII, 95-6.

is full of romantic feeling. We need not quote from Horace and Ovid, whose poetry is full of allusions to the beauties of nature.

But though the distinction between the ancient and modern feeling for scenery has been too sharply drawn, still it must be admitted that the wild and savage in nature did not arouse the same romantic feeling then as they do now. That love of the elemental, of the unhumanized in nature, for which we moderns feel an attraction, was only in its infancy in antiquity. Admiration for the grand and sublime, as we feel it, for instance, in our sentimental feeling for mountain scenery, for the beauties of sterile cliffs and crags and desolate snow fields, hardly existed among the Greeks and Romans. This is a peculiarly modern addition to æsthetics and never came to full fruition until the last century. Most of the first ascents of high Alpine peaks—as that of Mont Blanc in 1786—were purely for scientific purposes. Individual mountain peaks in antiquity were hardly separated in thought from the whole range of which they were a part and seldom had any other names. They were looked upon with feelings of religious awe and as fit places for altars to the gods.⁹² The love of such summits was perpetuated later by Christian Greeks and they were generally made sacred to St. Elias. The Roman feeling for rugged mountain scenery is well expressed by the terrific picture which Livy drew of the horrors of the lower Alps—though to be sure he never saw them—in which, after exhausting his powers of description, he ends by adding “*cetera visu quam dictu fœdiora.*”⁹³ Cicero also in the “*De Amicitia*” (68), when speaking of the influence of habits states as if exceptional that “we even take pleasure in mountainous and wooded regions, if we dwell among them a long time.” And in another place (*Leges*. 2), he represents Atticus as singing the praises of an island in a tributary of the river Liris and saying how agreeably disappointed he was on arriving, for he had expected to find only mountains and rocks

⁹² *E. g.*, on Mt. Atabyrion (Tabor) in Rhodes (4,070 ft.) are ruins of foundations of a Temple of Zeus. Mt. Athos had an altar on its top sacred to Zeus (cf. Mela, 2, 2, 31, and Æschylus, “*Agam.*” 285). The top of Mt. Lyceum in Arcadia (4,695 ft.) was also sacred to Zeus.

⁹³ *XXI*, 32. A most amusing explanation of these terrors “more horrible to see than to describe” is given by a recent commentator of this passage, who sees in them an allusion to the “repulsive idiots and the unfortunates afflicted with goiter” so common in Alpine valleys!

there. And the oft-repeated epithets of Vergil—"horrid, bristling, shaggy," etc., show the same feeling.

But even in Vergil we find the embryonic expression of our modern romantic feeling for mountain scenery. In the *Æneid*,⁹⁴ the poet compares Æneas exulting before battle to Mt. Athos or Eryx or

"Father Apennine himself, when he roars with his waving

Oaks and rejoices, lifting himself with his snowy head into the air."

Spartian even tells us that Hadrian ascended both Ætna and Mons Casius (in Syria) for the sake of viewing the sunrise; and other mountains were ascended not only for scientific and military purposes, but out of curiosity as nowadays.⁹⁵ So what Ruskin says of the Greeks, that they were wholly indifferent to rugged scenery, is surely not true of the Romans at least. The feeling was vastly more limited in antiquity than with us, but it were a mistake to say it did not exist at all. Shairp combats Ruskin's views thus: "No doubt the ancient had not that intimate, delicate, dwelling sympathy for Nature which we call the modern feeling. But there is hardly a tone of sentiment which Nature in modern times has evoked, of which some faint prelude at least might not be found among them."⁹⁶ It would have been curious indeed, if the many-sided and imaginative Greeks had not evinced an appreciation of all the varied manifestations of nature. For never was a race more keenly endowed with the sensitive appreciation of the beautiful, and it is doubtful if any country ever existed where the visual stimuli to the imagination are greater than in Greece, thus poetically described by Shairp: "Scenery so richly diversified, a land beyond all others various in features and elements, mountains with their bases plunged into the sea, valleys intersected by great rivers, rich plains and meadows inlaid between the hill-ranges, deeply indented shores, promontories wood-clad or temple-crowned looking out over the many-islanded Ægean;—around it on every side seas so beautiful, above it such a canopy of sky, changing through every hour and every season, and

⁹⁴ XII, 701-3.

⁹⁵ An ascent of Mt. Argæus (13,150 ft.) in Cappadocia, for the sake of the view, is described by Strabo, 12, 2, 7. The same author also describes an ascent of Ætna, 6, 2, 8. Cf. Tozer, "History of Ancient Geography," Ch. XV.

⁹⁶ *Op. cit.*, p. 157.

calling forth from sea and land every color which sunlight and gloom can elicit."⁹⁷ That the Greeks felt an intimate sympathy and love for it all, is shown by the wealth of romantic legend which haunted every spot of their tiny land. And such a "columned promontory" as that of Sunium, or such a foliage-embowered retreat as that in which Ægina's temple ruins stand, or the unrivalled beauty of situation of the Phigalian temple in the midst of a forest of venerable oaks—these sites are not without their significance. The picturesque location of their shrines and theaters, makes it impossible not to believe that they were actuated by a well-developed sense of natural beauty, even if definite proofs of such a feeling cannot be traced in their literature. So, though at least touched by all the tones of sentiment which nature can evoke, still the ideal of natural beauty among the Greeks—and after them among the Romans—lay rather in its quieter and more harmonious aspects, than in those that were wild and unusual and far removed from direct human interest. They came then to delight in picturing the peaceful pleasure of sylvan and rural scenes. The words of the Roman Quintilian,

"Species martimis, planis, amoenis"

"beauty belongs to sea-views, to plains and pleasant places" form a good summary of this ancient ideal. Vergil also touches it in his Tenth Eclogue, where Gallus, lamenting for his faithless Lycoris, thus sings the charms of nature near to his heart:

"Hic gelidi fontes, hic mollia prata, Lycori,
Hic nemus; hic ipso tecum consumerer ævo."⁹⁸

And Milton, so intimately acquainted with everything classical, has struck the ancient key in these lines on his blindness:

"yet not the more
Cease I to wander where the muses haunt
Clear spring, or shady grove, or sunny hill."⁹⁹

The question, then, arises, how did the poets see in the Vale of Tempe, where the scenery is characterized by savage grandeur, such delightful features as they pictured there? The answer is, that it never could have been the actual scenery of Tempe which called forth their praises; but that it was rather an idealized conception of it, which merely epitomized the accumulated outgrowth of Greek

⁹⁷ *Op. cit.*, p. 142.

⁹⁸ *Il.*, 42-3.

⁹⁹ "Par. Lost," 3, 26-8.

poetic feeling for nature, and which, in the slow course of time, had become fixed and the poets' conventionalized synonym for the beauty of nature. Thus the case with Tempe is not so very dissimilar to that of the Alexandrine Arcadia, for both became poetic ideals quite apart from what they really were. The actual scenery of Tempe seems from the first to have been but imperfectly known. The first historical description of an eye-witness of which we have any record is that of Polybius, which, from Livy's paraphrase, we know was at variance with the poetic conception of it formed long before. The romantic beauty of the entrance to the defile, the wooded slopes of Ossa and Olympus enclosing the little glade in which the modern village of Babá is situated, may in early tradition have stood for the entire vale. Perhaps the old Thracian bards, who prehistorically moved the Muses from the slopes of Olympus to those of Helicon, carried the germs of the tradition with them in some of their songs. In later times accounts of the wooded glade where Apollo's altar stood, were doubtless told by members of the various Delphic embassies sent every ninth year to bring the laurel from Tempe to the Castalian spring. But doubtless the entire defile was not known even to these noble youths and their train.

In Tempe, then, in the process of time, the Greek poets came to see their ideal of sylvan, rustic nature. The Roman poets of the empire carried the ideal further on. With them Tempe quite lost its original meaning as an actual place, and came to be used only in a fully ideal and generic sense of any lovely spot. Thus Vergil speaks of the

"speluncae vivique lacus et frigida Tempe"³⁰⁰

as the delights of the farmer's life, and Horace says that Tempe is a spot

"non zephyris agitata."³⁰¹

This is assuredly not the glen in far away northeastern Thessaly, but merely a figment of poetic imagination. And so the culminating picture, which we have seen in Ælian, and which was composed still later and upon the basis of all these accumulated fancies, was nothing more than a summary picture of the Græco-Roman ideal of nature.

³⁰⁰ Georgics, II, 469.

³⁰¹ Odes, III, 1, 24.

WILLIAM MORRIS DAVIS, GEOGRAPHER.

ELLSWORTH HUNTINGTON.

No science reaches maturity until it attains the power of prediction. So long as scientists merely gather facts or group them into systematic categories, their science lacks completeness. Maturity is attained only when a science is able to say that, given such and such conditions, certain specific results are sure to follow. When William Morris Davis began his work, about 1875, this mature or predictive stage had not been reached in most branches of geography. His life work has been to take the most neglected and yet perhaps the most obvious branch of the subject, and to transform it from a mere mass of undigested facts into a well-developed science. Geography, as every one knows, is commonly divided into two great sections, one of which deals with the physical phenomena of the earth's surface in the broadest sense, while the other is concerned with the relation of these physical facts to the distribution of animate beings and of their characteristics so far as these are peculiar to one region and not another. The first of these sections, commonly known as physical geography, is divided into three portions, dealing respectively with the atmosphere, or aerial envelope, the hydrosphere, or water envelope, and the lithosphere, or rock envelope which forms the lands. It is in this last field, the study of the lands, that Professor Davis has made his chief contribution to science. Nevertheless he has not confined himself to this entirely, but has done good work along other lines. In order rightly to estimate the importance of his labors, let us take up the various branches of geography, beginning with the atmosphere, passing on to the ocean and the lands, and ending with the living beings that inhabit sky, sea, and earth. In each case let us examine the position of the subject when Professor Davis began his work, and see what he has added.

In 1875, the study of the air, which includes the subjects of meteorology and climatology, had advanced to the explanatory and predictive stages. Students of the subject had worked out the laws of insolation; they had discovered the relation of these to atmos-



WILLIAM MORRIS DAVIS

pheric pressure, and the movement of winds, and they were thoroughly familiar with the importance of evaporation and condensation. They had worked out the effect of the rotation and revolution of the earth upon the various climatic factors, and they had developed a theory as to the origin of the terrestrial zones of winds and of climate, which was crystallized by Ferrell, and which in its main features is still accepted. Moreover, the importance of meteorology was so thoroughly recognized that international congresses had been held, and government weather bureaus were beginning to be established. Finally, as the crown of meteorological achievements Abbey had developed the method of weather prediction which is now used in all parts of the globe. In other words, meteorology had passed through all the stages of a complete science and was able to predict future events. To be sure, it is not yet possible to do this with absolute accuracy, and we still have ahead of us a task of almost indefinite length, first before we arrive at a true understanding of the causes of the fluctuations of the weather, and second before we attain the ability to predict the weather conditions for weeks, months, or even years in advance. Abbey's epoch-making discovery, however, crystallized meteorology into a full grown science, whose main outlines have not since been changed. Nevertheless many important advances have been made. Professor Davis has had an honorable share in these, although his chief contribution to science has by no means lain in this line. During the earlier years of his teaching of geography he felt the need of a text-book of meteorology; as there was none to be had which suited him, he went to work to write one. The book does not pretend to announce any new discoveries, but even to-day, after twenty years, it is recognized as one of the best books in its special field. If this were his sole contribution to science, he might well be proud of it.

In 1875, the subject of oceanography was as far advanced as that of meteorology. Aside from its importance in navigation, the subject does not touch men so closely as do the other branches of geography, since we breathe the air and walk upon the land, while we merely cross the ocean at rare intervals. Nevertheless, international congresses for the discussion of oceanography had been held in Brussels in 1853 and in London in 1873. Maury and others had formulated the great principles of oceanic circulation; and the relation of the oceans to climate was well understood. Active work

in solving the remaining problems of the oceans was going on in the form of the famous *Challenger* Expedition under Sir John Murray. To the ambitious beginner in the science of geography, therefore, the subject of oceanography offered relatively little opportunity. It was fascinating, but it was a subject which, in the nature of things, only a few persons could study, and in which there was at that time no crying need for more abundant investigation. Hence Professor Davis has never attempted to engage in original work along this line, although he has made constant use of the principles of the subject in his teaching and text-books.

The portion of geography wherein the greatest deficiency existed when Professor Davis began his career was the study of the lands. No one can deny that a true understanding of the physical features of the land whereon we walk each day, and from which we raise the food that preserves life, and upon which we build our houses, our railroads, our factories, and all that we have, is of inestimable importance. Yet, in 1875, the world had practically no scientific knowledge of the subject. Geologists, to be sure, had made great progress in interpreting the physical processes by which the earth has attained its present form, and they were busily and successfully working out its past history. Some of them, indeed, had made a praiseworthy effort at the scientific interpretation of the surface of the earth as we see it in the daily walks of life, but their efforts had scarcely done more than call attention to the great gap in geography toward the filling of which Professor Davis was later to do so much. Yet even among geographers, the majority had apparently never realized the necessity of such scientific interpretation. They thought, as many of those who belong to the most progressive geographic societies still do, that map-making and exploration were the chief objects of geographical research, and that when a land had been thoroughly mapped and had been described in empirical terms, the work of the geographer was completed. They saw that the students of the air and of the ocean were framing exact laws and were able to tell precisely what would happen under certain conditions, but most of them had no definite conception of the necessity for a similar treatment of the land. Only in a few simple cases did the names of the various features of the earth's surface suggest to the mind of the geographer any adequate explanation of how those features came to exist. Everyone, to be sure, recognized that the

expression "a volcanic crater" carries with it, by implication, a full statement of the fact that a volcanic eruption has thrown out lava or ashes, and that ultimately the volcano has built up a cone-shaped mountain with a depression in its top. It was recognized, too, that a beach implies the presence of a body of water whose waves act upon the shore. A valley also was considered a necessary adjunct of a river, but many people who called themselves geographers were still in doubt as to whether the valley was there because of the river, or the river because of the valley.

When Professor Davis began to teach geography at Harvard he found himself face to face with this problem of land forms. He has often talked with the writer about the difficulty he experienced in his early teaching because of the impossibility of finding any books which adequately discussed the forms of the hills, plains or other features of ordinary scenery. Therefore, he set himself to work to put the study of the lands upon as firm a basis as that of the air or the water. How thoroughly he has re-made the subject may be judged from the terms in use. The words meteorology and oceanography have long been recognized, and there is no question as to their meaning. For the study of the lands, however, no term existed until recently. Professor Davis himself has generally spoken of his special work as the study of land forms. Huxley invented, or at least popularized, the use of the term physiography as a name for the science of nature in general. Professor Davis took this term and limited it to the study of all the inanimate features of the earth's surface, including the atmosphere, hydrosphere and lithosphere. He meant it to be the antithesis, or better, the complement of ontography, by which term of his own invention he meant to designate that half of geography which is concerned with animate things and their relation to geographical environment. His own work, however, prevented the word physiography from being used with the implication that he intended. In the first place, he showed most forcibly that for the world at large the study of the laws governing the form of the land is no less important than the study of the laws of meteorology or of the ocean. In the second place, his own work placed so preponderating an emphasis upon these same land forms that the term physiography, in the mind of both the student and the general public, became associated with

these features of the subject, rather than with physical geography as a whole.

In the study of physiography, by which I now mean the study of the form of the land, including its rivers, lakes and shores, Professor Davis has continually emphasized the need of explanatory, as contrasted with empirical, descriptions. His aim has been to develop a method whereby a trained man can describe the landscape of any portion of the globe in the briefest possible way and with the maximum amount of lucidity. For this purpose he has always insisted on the necessity of a geological background. The first requisite in the comprehension of a hill, a valley, a plateau, a plain, a shore line, or any other feature of the earth's surface, is a knowledge of its rock structure. Not that the geographer must be able to distinguish one species of gneiss or granite from another, or that he must know whether the limestone he is dealing with is Cambrian or Jurassic, but he must understand the difference in solubility, rate of weathering and resistance to erosion, of the various types of rocks. Moreover, he must understand enough of geology to be able to estimate the influence of folding, faulting, jointing, or other processes upon the attitude of the rocks and upon their resistance to the atmospheric forces which have brought them to their present form. In other words, the first essential to an understanding of the scenery of a country is some knowledge of its rock structure.

The second essential is a knowledge of the processes which have acted upon rocks of a given structure. Professor Davis has taken a foremost place in describing and evaluating the enormous differences in scenery which arise from the differences in the process of erosion. Save in regions very lately uplifted from the ocean, practically all scenery, as we now know, owes its appearance not to convulsions of the earth's surface whereby valleys have yawned and mountains have been heaved up, but to the processes of weathering and erosion, whether by running water, creeping ice, or swiftly moving air. Under condition of aridity these processes produce results very different from those produced under ordinary conditions of moisture such as we have in the eastern United States, or in western Europe. The results of these two processes again are notably different from those arising from the erosion of glaciers, or of the sea; while the topography of tropical lands possesses features distinctly different from those acquired where snow prevails for a

large part of the year. Evidently then, in order to understand the scenery of a country, it is not enough to know the structure; we must also know what process, or processes, have been at work upon it.

The final step in the comprehension of the form of the land is a knowledge of the stage of erosional change which it has reached. No one feels that he can form a mental picture of some unknown person unless he knows the approximate age. Even so, with the lands. Before Professor Davis undertook to study them, it was a common thing to describe all lands as if they were of the same age—which is just as illogical as it would be for the author of a novel to describe a child of five and a man of sixty in the same terms. Professor Davis saw that the form of the earth's surface is in continual process of evolution and that different stages follow one another in logical order. Others before him had known that valleys change their form from millennium to millennium, but it remained for him distinctly and fully to set forth those stages one by one, and show how they vary according to structure and process. As a result of all this the world's stock of ideas has been increased by a new and fruitful conception of the hills, valleys and plains that surround us. Thoughtful people no longer think of the scenery as unchanging, but as subject to continual modification and development according to distinct and readily comprehended principles. Professor Davis, has, so to speak, taken a supply of timber, hewed partly by himself and partly by others, and has prepared a series of compartments wherein we may put the features of the earth's surface. The compartments are classified according to three heads: structure, process and stage of development. When all three are known, the mere statement of them enables us to form a clear picture of the place concerned, or to write a description of it which shall be intelligible and interesting to the reader who understands the rudiments of the subject.

The value of the work of Professor Davis lies not merely in the fact that he has filled the most obvious gap in the science of geography, but in the degree to which he has stimulated all other parts of the science. His work has made it easy to observe and to describe. The conditions now, as compared with those of thirty or forty years ago, are comparable to the difference between a man who cannot distinguish between an angiosperm and a gymnosperm, and

the one who is familiar with all the chief genera of plants. The unknowing man passes through a virgin forest and recognizes that some leaves are large and some small, and some plants have beautiful flowers while others have merely insignificant greenish inflorescences. Both men may be equally intelligent and equally interested in giving a good description of the forest, but the one cannot set down his observations—not only because of the large number of words required for empirical descriptions, but because he is obliged to attempt the impossible task of observing and describing every individual feature of each plant. The other, on the contrary, is able to give a valuable description because he sees at a glance that a given bush belongs to a certain genus of the Rosaceae, and the only things to be recorded are that fact and the one or two points in which the specific plant differs from the generalized type. In the same way a geographer who has studied the methods of Professor Davis is able to observe the features of a landscape rapidly and to describe them succinctly.

Quite as important as the increased facility of geographic observation and description which has come from Professor Davis's work is the added interest which it lends to the travels of persons who have had even an elementary training in physiography. Time and again I have heard of men or women who are enthusiastic over the new pleasure which has been brought to their travels by a perusal of Professor Davis's writings. Most of my readers know from their own experience that the more fully one is able to explain the scenery of a railroad journey, for instance, the more interesting it becomes. The man who thoroughly understands the matter never tires of looking out of the window. In an unknown country, even in a desert, he continually sees that which is new; while in an old country which he is thoroughly familiar with, his powers of observation grow by use, and each further bit of explanation in accordance with physiological principles adds a new zest to his wanderings.

Professor Davis's great contribution to geography has been, as we have seen, the systematizing of the science of physiography, but that is not his only claim to our gratitude. So far as the other half of geography is concerned—the half which he has called ontography—he has avowedly done but little. He has made many most interesting and valuable suggestions as to the relation of physical features to the activity of living beings, but he has not attempted to frame the

laws of the subject or to elucidate its principles as he has in the case of physiography. This is not because he does not realize the importance of the subject, for he is keenly alive to it. More than once I have heard him say to his students, "You younger men must go on and work out the relation of man and other living things to their geographical environment. You must get at the laws which govern this matter, and must find out how to present the subject. That I cannot do. It is too late now; my work has been to develop the subject of physiography. That was the need when I began; the next need is a fuller study of the relation of life to geographical environment."

This brings us to one of the most interesting and valuable features of Professor Davis's career—namely his relation to other scientists. No one who knows him has failed to notice how frequently he becomes the center when a group of geologists or geographers gather.

When any important question arises, someone is almost sure to turn eventually to Professor Davis, and his opinion is listened to with a respect accorded to only a few men in a generation. His criticisms are often keen and sometimes severe, and yet his fellow-scientists are thankful for them. He sees to the heart of a subject, and time and again his suggestions have changed men's views in such a way as to enable them to make their contributions strong instead of vulnerable. Of late years he has been keenly impressed with the necessity for clearer and more forcible methods of writing than are commonly found among scientists. He has felt—as who has not?—that good work is often spoiled by poor presentation; and he has also felt the force of the corollary of this proposition, namely, that for the attainment of clear thinking and intelligent observation nothing is more helpful than the confirmed habit of clear and logical presentation. Therefore he has written a series of articles which, while important because of the facts, hypotheses and arguments presented, are more important as models of scientific literature. Some of the best of these are his papers on glaciation, part of which are collected in his volume of "Geographical Essays," edited by Professor D. W. Johnson. One lays them aside with the feeling that every possible hypothesis, every important consequence of each hypothesis, and every fact that may bear on the case has been considered. When Professor Davis has finished with a subject, there seems to be

nothing left to say,—a remark which I have often heard after he has made an address.

Curiously enough this very perfection of his scientific methods carries with it a temporary danger. The fellow-geographers of Professor Davis, younger than himself, are greatly stimulated by his clear and forceful presentation, but the very fact that he has done such brilliant work diverts many of them from pure physiography. Inasmuch as there seems nothing left to do on a subject which he has discussed, they turn to other phases of geography, such as regional geography or anthropogeography. The science as a whole is enormously the gainer, not only by reason of the increasingly broad field which is covered, but by reason of the better methods used in all branches. Nor will physiography suffer any real harm, for as soon as other branches reach a stage at all comparable to that to which Professor Davis has brought this particular branch all parts will advance together.

In the future Professor Davis will be recognized chiefly as the father of the science of physiography. Yet, to those with whom he comes in immediate contact his method of work is quite as valuable as his achievements. While he is in the field, or is engaged in the preliminary work of observation, he insists upon forming hypothesis after hypothesis. He insists, too, that the hypotheses must be formed and tested while the facts are capable of observation. Many scientists make their notes, take them home and think about them later. Professor Davis decries this habit. The time for testing an hypothesis is while it is still possible to make observations. The proper method of work is to think out the consequences of each hypothesis and see whether the facts agree with the exceptions. While this process is going on the scientist is capable of acting as a judge. I have heard it said by one who greatly admires Professor Davis that he is an advocate rather than a judge: that his temperament is that of the pleader rather than of one who renders a calm and unbiased judgment. This is true in part, and in it lies one secret of Professor Davis's strength. At first, while he is making his observations, he is calm and judicial. When an opinion has once been formed, he supports it with ardor. Not that he is unwilling to see the other side, but being once convinced, he has the love of doing well and forcefully whatever comes to his hand. All of the world's chief benefactors have been men who, when they once became con-

vinced of the truth of an idea, have endeavored to get that idea accepted,—and Professor Davis is no exception.

One of the strongest evidences of the importance of Professor Davis's career is found in the uncommonly wide extent of his influence. In almost any geography, one finds either direct references to his work, or else a form of thought or expression clearly indicating his influence. Again and again one takes up articles from Australia, India, Germany, or some other part of the world, and says at once, "This man has been reading Davis." So wide an influence indicates the wide range of the subject and also the need of his work which has been felt unconsciously in all quarters of the globe.

Of late years he has increased his influence through his two terms of service as exchange professor, one at Berlin, 1908-09, and one at Paris, 1911-12. The success of these two terms is largely due to his having lectured in German and French and this was the result of his constant industry. For some years he spent his odd moments in studying French and German in order to speak as effectively as possible. On the street I have seen his lips moving as he talked to himself in French in order to perfect himself in the presentation of his results to Frenchmen. As a result of this he has been able to influence his German and French students just as he has influenced those in America. One of his books, translated and adapted to German use by Dr. G. Braun of Berlin, is destined to be widely influential in spreading his ideas in Germany; and now he is publishing various articles in French. Few people have made greater efforts or been more successful than he in spreading their conclusions beyond the narrow bounds of a single country.

I have spoken of the relations of Professor Davis to his students. It is through them that he is doing much of his work. He has impressed himself so strongly upon them that many of the books which they are writing may almost be considered as his own contribution. In his contact with them nothing has seemed too small for consideration. He has criticised their methods of observation, of thought, and of style, and many of them recognize that they have learned more from him in regard to the writing of English than from any of their other instructors. The position of physiography to-day as one of the growing sciences is largely the work of Professor Davis. Many of the geographers who are actively at work in America at

the present time have been his pupils and owe to him their inspiration. When they meet, the conversation seems naturally to go back to him and to the things he inculcated. They feel that they have not been mere scholars and he a mere teacher, but that they have been disciples and he has been their master.

SOUTH FLORIDA: A GEOGRAPHIC RECONNAISSANCE.¹

JOHN W. HARSHBERGER, PH.D.,

PROFESSOR OF BOTANY, UNIVERSITY OF PENNSYLVANIA.

There are not many places in the United States which have not been explored thoroughly and for which we do not have relatively accurate maps. This statement with certain qualifications might be made of the globe. Peary reached the North Pole in 1909. Amundsen planted the Norwegian flag at the South Pole in 1911, and Sven Hedin and other explorers have made known the geographic character of Central Asia. Although the peninsula of Florida, south of the 27th degree of north latitude, is a small portion of our national territory, yet, no two maps of that part of Florida agree in all essential geographic details. There are many districts south of Lake Ocheechobee that are terra incognita to the scientific geographer. That no accurate maps of this territory exist, notwithstanding that a number of maps of recent issue have covered this region, is due to several reasons. First, the country is one extremely difficult to penetrate, being covered by dense growths of saw grass, cypress and tropic vegetation. The cypress swamps are so far removed from the coast that the exploitation of their timber resources has not been attempted. The southwestern coast of the peninsula along Ten Thousand Islands and Whitewater Bay is a labyrinth of mangrove islands, which few white men have ever penetrated, and on a dangerous shore strewn with the wrecks of many good vessels. Second, it has been found difficult to locate by actual surveys the relative extent of the land and water areas, because these vary relatively with the seasons. During dry weather the land occupies much country which is entirely under water during the rainy seasons. A map constructed from surveys made during the dry season will show many land features which would not be shown on a map constructed from data obtained during the wet sea-

¹ This is an abstract of Professor Harshberger's trip to South Florida, taken in June, 1912, under the auspices of the Geographical Society of Philadelphia.—THE EDITORS.

son. Third, the survey of South Florida has been delayed also in part for the reason that outside of the land itself, which is now being exploited, the country has had only three sources of wealth, namely, its timber, its fish and its game.

The country is as little known to the physiographer, the geologist, the botanist and the meteorologist as to the geographer. Observations have been made heretofore in spots only. Until recently no attempt has been made to study South Florida from a general scientific standpoint. Recently the state geological survey has been active in a study of the physiography, geology and mineral resources of the region. The Smithsonian Institution and the Bureau of Ethnology have made at times an investigation of the tribal customs and ethnic characters of the Seminole Indians. Clarence B. Moore, of Philadelphia, has made an exhaustive study of the shell mounds of Florida. Little careful study of the vegetation has been made from the geographic side, although, systematically speaking, the plants are fairly well known.

ITINERARIES.

With the object of investigating the problems involved in the geographic distribution of the plants the writer has made three trips to South Florida, two at his own expense and the third under the auspices of the Geographical Society of Philadelphia, in June, 1912. The first two trips were made to the east coast, as far south as Long Key. Botanic observations were made from the windows of moving trains travelling north and south and extended stops were made at St. Augustine, West Palm Beach, Delray, Miami, Princeton, Naranja, Homestead and Detroit, where plants were collected, and where geographic notes and maps were carefully made. The coastal islands and the Everglades were visited on both of these visits. In the third journey to Florida under the auspices of the Geographical Society of Philadelphia, it was planned to cover a wider territory and to supplement the botanic and geographic observations of the first trips by a visit to the west coast. While Miami was chosen as headquarters during the visits to the east coast, Ft. Myers was made headquarters for the botanic exploration of the west coast (3). Accordingly leaving Philadelphia on Saturday, June 1, 1912, Ft. Myers was reached early in the afternoon on Monday, June 3.



FIG. 1. SALT MARSH BACKED BY A THICKET OF TREES AND SHRUBS WITH TALL PALMETTOS NEAR FT. MYERS, FLA., JUNE, 1912.



FIG. 2. SOUTH BANK OF CALOOSAHATCHEE RIVER WITH TALL FERNS AND SLASH PINE, JUNE, 1912.



FIG. 3. ATTRACTIVE SOUTHERN HOUSE IN FT. MYERS, FLA. The royal palm is draped with purple-bracted Bougainvillea. Allamandas and Thunbergias are in the corner, June, 1912.



FIG. 4. ORANGE GROVE OF MR. DEAN ON SOUTH SIDE OF CALOOSAHATCHEE RIVER, ONE MILE WEST OF FT. MYERS, JUNE, 1912.

While at Ft. Myers the flora of Sanibel Island, Punta Rassa, Six Mile Cypress (south of the town in the interior), Billy's Creek and its mangrove vegetation, the pine forests and river plants were investigated. Finally leaving Ft. Myers on June 19, the mail steamer was taken to Labelle, 45 miles up the Caloosahatchee River. Owing to the torrential rains, a stop of only one day was made at Labelle, because the town was entirely under water. Proceeding from Labelle through the courtesy of the Furst-Clark Drainage Canal Construction Company, I was able to travel up the Caloosahatchee River across Lake Hicpochee and Lake Ocheechobee to the entrance of the South Canal on the south shore of Lake Ocheechobee. Photographs and detailed observations of the country and its flora were made enroute to the excellent hotel on the south shore of the lake kept by Mrs. W. F. D. King. Here, during a sojourn of several days the vegetation of the lake shore and of the nearby custard apple forest was studied. Taking the launch shown in the photograph (5) with a party of three surveyors, we proceeded across the Everglades to Ft. Lauderdale. From the entrance of the South Canal to the entrance of the North New River Canal is a distance along the south shore of Ocheechobee of about 10 miles. The North New River Canal, opened for the first time on April 25, 1912, across the Everglades, is 61 miles long. Reaching Ft. Lauderdale after a delightful trip across the Everglades, two days were spent in a visit to Key West by way of the Florida East Coast Railroad.

THE COUNTRY.

South Florida may be considered to be that part of the state south of the 27th degree of north latitude. It is a country of no relief. In some places, it is perfectly flat; in other places, slightly rolling. The northern part of this territory on the east coast has ancient dunes of considerable height, that consist of silicious sand covered with spruce pine, scrub oaks, saw palmettos and rosemary. This sandy soil is exactly suited to the pineapple and, hereabouts, there are large plantations devoted to the cultivation of this fruit. South of the sandy belt the soil is rocky, owing to the exposure of oolithic limestone, which breaks into loose nodular fragments. This limestone makes the finest material for road construction and the roads, when properly built, are as hard and smooth as asphalt. The

slash pine (*Pinus caribaea*) forms unbroken forests on this land and the undergrowth consists of saw palmetto, coontie and a great variety of attractive flowering herbs and shrubs. It is an open sunlit forest and one can see at least half a mile between the tall pine trees. The western part of South Florida along the Gulf coast has a sandy soil without any rock exposures. The beaches consist of calcareous sands which represent the remains of shells and coral polyps ground into powder by surf action. Along the rivers are large deposits of oyster shells, which are used in the surfacing of the roads in and about Ft. Myers. The central part of South Florida is entirely different physiographically from either the eastern, or the western portions. Here is found that magnificent and beautiful body of clear water, Lake Ocheechee, which is intimately connected with the Everglades by the fact that the underground water from the lake emerges as springs through the Everglades. Appended to the southern extremity of Florida are a series of islands, or keys, connected together like a chain of pearls by the recent completion of the Florida East Coast Railroad, as far as Key West. The rivers of the east coast are short, running from the Everglades to the Atlantic across the pineland. The rivers on the west coast are either connected with the drainage system of that magnificent stream the Calloosahatchee River, which drains at least one half the State of Florida since the canals were completed between it and Lake Ocheechee, or else the rivers arising in the cypress swamps and Everglades run a short distance toward the southwest and empty into the Gulf of Mexico. Many of these streams have never been charted and the exact length of such as the Shark and Harney rivers has never been determined. In fact some maps do not show these rivers at all. An accurate survey of this part of Florida is a great desideratum.

THE VEGETATION.

It is one of the characteristic features of the vegetation of South Florida that the lines of demarcation between the different floral types are so sharply drawn. For example, the boundary between a prairie and a pine forest is usually a sharp one. Hence, one can map in a fairly accurate way the different plant formations with the satisfaction that these areas are distinct and natural ones.



FIG. 5. LAUNCH *Skipjack* USED BY WRITER IN CROSSING FLORIDA EVERGLADES IN JUNE, 1912. Party of surveyors on board.



FIG. 6. LARGE STEAM DREDGE USED IN CUTTING THE DRAINAGE CANALS ACROSS THE EVERGLADES.

Not only are these areas of vegetation to be distinguished by the trained phytogeographer, but they represent tracts of the earth's surface which are recognized by the people of the region and are everyday matters of conversation with them. In a study of the vegetation of South Florida, the following types of vegetation, or plant formations, can be distinguished. In the order of interest, they are pine forest, hammock (river, palmetto, etc.), Everglades, lake vegetation, rosemary scrub, cypress swamp, prairie (coastal, saw grass, maiden cane), cypress heads, mangrove swamps, sea beach flora, sea thicket, swamp (1), river bank (2) and salt marsh formations. As the object of this paper is to give a general idea of South Florida, it will not be possible to describe these plant formations in detail. Only a few facts will be mentioned, and a complete account will be published later.

The pine forest is an open one of tall slash pines with columnar stems. The undergrowth is low and is mainly saw palmetto, coontie and a few evergreen oaks, bushes, or shrubs. Many brightly colored flowers enliven the forest throughout the year. The hammock vegetation is of the greatest luxuriousness. Here are large live oak trees festooned with Florida moss and loaded with the greatest variety of air plants, which include ferns, orchids, bromeliads and the like. The weight of these epiphytes is at times so great that the limbs of the trees are broken off like pipe stems. Many of the bromeliads resemble birds' nests in the arrangement of their leaves, which are so closely fitted together as to hold a large quantity of water. The spike of flowers with brightly colored bracts grows up a considerable distance from this rosette of leaves. The climbing vines (lianes) growing from tree to tree and the palmetto, which fills up the spaces between the live oaks, give to this type of forest a dark impenetrable look which is generally associated in the minds of the laity with a tropic forest reeking with moisture. In a visit to subtropic Florida, many of these preconceived ideas of tropic vegetation must be set aside.

The vast area of country known as the Everglades is essentially a huge saw grass swamp (5). The continuous masses of saw grass to the even horizon line are relieved only by clumps of bushes, or low trees, and by lagoons and slues filled with water lilies, spatterdock, pickerelweed, wampee, rushes, sedges and other aquatic and marsh plants. The saw grass is a tall sedge, the leaves of which

being slightly folded along the midrib give a triangular shape to a cross section of the leaf blade. The margins are roughly serrate and cut like a saw. It is a formidable sedge to travel through. The usual drainage of the Everglades is toward the southeast and this fact is taken advantage of in the location of the drainage canals which in a few years will cross the country (6). In following the recently constructed North Canal in leaving Lake Ocheechobee, the explorer passes through a low forest of custard apple trees for about 3 miles and then enters a part of the Everglades where the saw grass is so dense and the boat channels are so few that the Seminole Indians never penetrated the northern part of the glades. The boat channels, however, are found to increase in number about 30 miles south of Lake Ocheechobee. The slues and lagoons are more numerous and the islands of small trees increase in number, so that the monotonous stretches of saw grass become diversified by low trees and lagoons of open water.

The water along the whole south shore of Lake Ocheechobee is shallow and grown up to partly submerged grasses and sedges, while back of these water plants is a strip of tall grasses fronting the almost continuous border forest of custard apples. A number of wooded islands are found at the south end of the lake. These have been named Observation, Rita, Kraemer and Torry islands. They are all wooded and fringed with grasses and attractive aquatic plants. Torry Island has in addition a central prairie comprising 300 acres of open, grassy land. Some few years ago the existence of these islands was a matter of rumor and their exact location in the lake was problematic. An early homesteader took up land on Observation Island, applying to the land office at Washington for the registration of his homestead. The land office had no map that showed the location of the island, nor was there any official record of its existence. The settler did not get his title, but has continued to reside on the island. The land has passed to the State of Florida and an interesting question of law may arise, if some one else claims the land, which the pioneer has cleared and cultivated for a number of years. With the completion of the North Canal, Lake Ocheechobee has three drainage outlets: 1st, underground through the Everglades; 2d, through Three Mile Canal into Lake Hicpochee and thence to the Calloosahatchee River, and 3d, through the North Canal into the New River and the Atlantic Ocean. The lake, which is 36



FIG. 7. GROUP OF SEMINOLE INDIANS ON THE MIAMI RIVER, DECEMBER, 1910.



FIG. 8. CONVICT LABOR CAMP ON ROAD WEST OF FT. MYERS, JUNE, 1912.

miles long from north to south and 30 miles wide from east to west, ranges in depth from about 4 to 20 feet and with a strong wind, the troubled waters make navigation dangerous for small launches, or sailing craft.

The mangrove swamp vegetation is of geographic interest, because it is a well known fact that the mangrove tree perched in the air on long stilt-like roots is instrumental in the collection of mud, shells and debris by which the dry land areas of Florida are increased. It will be an important plant in finally fixing the embankments of the Over-Sea Railroad. The seedling is viviparous. It hangs out of the fruit until it drops to the mud below and taking root forms another tree outside of the parent one, so that the shore line is advancing slowly seaward.

THE ANIMALS OF SOUTH FLORIDA.

One thing that surprised the writer on his trip across Lake Ocheechobee and the Everglades was that there are so many alligators left in the region. Four live 'gators were seen and 3 dead ones which had been skinned by alligator hunters, and now the prey of flocks of buzzards, that are common in the country. The moccasin snake is thoroughly aquatic. One was passed at least a mile from shore in Lake Hicpochee, and a large one, as thick as the wrist, turned and hissed at the passing launch. The chameleon-like lizard (perhaps *Anolis*) is an attractive little creature, as it changes its color to suit its surroundings. Several quite large ones were seen basking on the sunny side of large forest trees. Several butterflies were seen, but they were rather scarce. I had expected to find swarms of mosquitoes in the marshy stretches of Florida, but during my trip across the Everglades, except in the evening, not one was felt. In the custard apple forest quite a few were encountered, but I cannot say that they were particularly annoying.

The bird life, however, adds great interest to a trip across Lake Ocheechobee and the Everglades. Here were seen the water turkey, that can swim with its whole body under water, the great blue heron, the white crane, the red-winged blackbird, the buzzard, several kinds of hawks, the eagle and the cormorant. My first night's sleep at the hotel on the south shore of Lake Ocheechobee was disturbed by the noises from the lake. The screech of the night

hawk, or goldback, could be distinguished above the ceaseless chorus of the frogs, some of which have piping notes, others a deep metallic, or bell-like, call. Some frogs make a cricket-like noise. Others have a deep bass tone. One species of frog made a prolonged ba-a-ap call. Amid all this din of insects, birds and frogs, the occasional grunt of an alligator could be distinguished. The glow lights of thousands of fireflies were also noted. Several kinds of turtles are caught at sea off Key West (10).

THE SEMINOLE INDIAN.

Reduced to 275 souls in 1908, the Seminole tribes have retired to the fastnesses of the Everglades. On the first two trips at least a dozen of them were seen with legs bare to the knees and with bright-colored clothing (7). Only one Indian was seen during the last trip to Florida and he was on the streets of Ft. Lauderdale, wearing a bright-colored shirt and a pair of ordinary trousers. President Taft has set aside recently Pine Island along the eastern border of the Everglades as an Indian reservation. This island surrounded by saw grass vegetation includes some of the finest and best drained land in the glades. An outrage against the Seminole nation was committed last December, which illustrates how the American people have treated the aborigines. DeSoto Tiger, a member of the tiger clan, was considered one of the best and most successful hunters. He had trapped otters until he had enough of skins to realize him about eight hundred and fifty dollars. On his return from Ft. Lauderdale, where the skins were sold, he was waylaid by a white man on the North Canal about 23 miles from Lake Ocheechee, shot and relieved of all his hard-earned money. The perpetrator of this dastardly deed has never been apprehended and a sign board along the North Canal marks the spot where the Seminole met his death on December 28, 1911.

AGRICULTURAL POSSIBILITIES.

The finest kinds of citrus fruits can be raised on the sandy soils of the Caloosahatchee drainage basin (4). The rocky soils of the east coast of Florida are also well suited for the growth of grape fruits and oranges. Although it is claimed that the soil of the Everglades is adapted to the growth of these fruits, yet it is probable



FIG. 9. HARBOR OF KEY WEST, FLA., JUNE, 1912, WITH SHIPPING.



FIG. 10. WHARF AT KEY WEST WITH GREEN, HAWK'S BILL AND LOGGERHEAD TURTLES FRESHLY CAUGHT AT SEA, JUNE, 1912.

that it will be found more profitable to grow other crops for which the soil seems better adapted. Several experimental farms have been started on Everglade soil. At Callahan's farm on the south shore of Lake Ocheechobee can be seen all kinds of plants from temperate, as well as tropic countries, the success of which in the deep black muck soil is being tried. Here are 30,000 orange trees in one nursery, seven varieties of bananas, eucalyptus, rubber trees, guava, Australian pine, strawberries, rhubarb, buckwheat, corn, grapes, Irish and sweet potatoes, peanuts and sugar cane. It is the conviction of the writer, having seen various of these plants growing in the black peat soil, that the following will probably be most successful: sugar cane, sweet potatoes, bananas, strawberries, asparagus, pumpkins and watermelons. Irish potatoes become too large and watery in the deep muck of the Everglades. Peanuts do exceptionally well. The roots of the red clover were found covered with root tubercles, indicating that perfect bacterial inoculation had taken place. Alfalfa and peanuts did not have these root tubercles, as far as the south shore plantation was concerned. All that the Everglade land needs is thorough drainage and the application of mineral fertilizers to produce big returns. In fact, the urgent need of a large part of southern Florida is a detailed and scientific drainage system. As it will be many years before such a system of drainage will be consummated, the prospective settler should be extremely careful in the selection of his land. He should be sure of two things. First, that the land is high and dry during all seasons of the year, and second, that it has reasonable fertility and is reasonably porous, to take care of the excessive rainfall, which is the rule during certain seasons of the year.

SETTLEMENT.

Many new towns have been started in South Florida within the last year, or two. On the second trip to Florida in August, 1911, the writer botanized about Detroit, a town, which, only four months old, boasted two stores, a hotel and a postoffice. This year two towns have been commenced on the shores of Lake Ocheechobee. Near the mouth of the North New River Canal, two and a half miles from the lake, is a new city which bears the name Okeelanta, a combination of Ocheechobee and Atlantic. Another city laid out on

the east shore of the lake by a land company is called Long Beach. When the extension of the Florida East Coast Railroad shall have reached the north shore of Lake Ocheechobee next year, a town will be built at the terminus and will be known as Ocheechobee. From this place, as a distributing center, all points on the lake can be reached easily by steamboats which will no doubt make regular trips to supply the settlers, who will rapidly flock into a country, which this year is one of the least known and one of the most inaccessible in all of the United States. During my stay in Florida, a regular service had just been inaugurated by boat between Ft. Lauderdale and Ft. Myers, but on account of the high water prevailing, this regular service had hardly assumed smooth running order. During the next tourist season, it will be possible to cross the state by water via the Everglades and Lake Ocheechobee.

The people, who are settling South Florida, hail from all parts of our country. They are a hardy race who will by hard labor prepare the way for those who will make of the land a garden spot of the world. The pioneers laugh at obstacles which seem almost insurmountable. No catastrophe of fire, of flood, or of storm seems too great to daunt their purpose. They are rough and uncouth in their dress and language perhaps, but they are a people worthy of our greatest admiration, for they will open up a country which is to-day a primeval wilderness. Forests are to be cleared, swamps are to be drained, carriage roads and railroads are to be built and municipalities established. The surprise is that it has taken such a short time to accomplish what has seemed an impossibility. Convict labor is used and properly in the development of roads through a country which is poor in money and poor in laboring men. Without such use, the criminal would be an additional burden on the community. The photograph taken near Ft. Myers illustrates how the convict is confined in grated vans during the night under the eyes of armed guards, who also serve as construction superintendents during the day (8).

THE OVER-SEA RAILROAD.

Next to the Panama Canal one of the greatest engineering accomplishments of recent years is the Key West extension of the Florida East Coast Railroad across the Keys to the so-called Gibraltar of

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America. The product of Henry M. Flagler's constructive genius, the extension has been built against almost insuperable obstacles. No one who has not seen this railroad can form any adequate estimate of the magnitude of the labor involved. When the construction was begun there were no precedents and consequently many problems had to be solved. The great autumnal storm of 1909 put all of the construction to the severest of tests. Miles of wooden trestle were swept away, and it was decided, that instead of six miles of open water spanned by bridges there must be eighteen. Although trains have been running to Key West (9) since the opening of the railroad on Monday, January 22, 1912, much of the construction is purely of a temporary character, which is being replaced as rapidly as possible by permanent viaducts and steel bridges. There are many miles of wooden trestles across which the train slowly runs, which will be replaced by earth embankments, concrete viaducts, or steel span bridges. The mangrove will help protect the embankments from the encroachments of the sea.

It repays the traveller to ride across such wild and romantic islands made famous by the buccaneers and inhabited by the attractive conchs who make fishing and wrecking their means of livelihood. The train runs across sunlit seas where the clear water enables one to see the tropic fishes and bright colored seaweeds and coral to the best advantage from above. The next few years will see an increasing number of tourists southward bound across the keys to Cuba, Jamaica, Panama and other Central American ports, who desire to avoid the long ocean voyage and its manifest disadvantages.

THE BRYANT EXPEDITION TO LABRADOR.

Henry G. Bryant, President of the Geographical Society, arrived in Philadelphia on September 20, after an absence of three months, during which he was engaged in an exploration of the Saint Augustine River, which enters the Gulf of Saint Lawrence in Canadian Labrador.

Mr. Bryant's party reached the Hudson Bay Company's post at the mouth of the river on July 6, where they were fortunate in meeting a number of Montagnais Indians on their annual visit to the coast. Profiting by the good offices of the French missionary priest, two native guides were secured, who engaged to accompany the party half way to Northwest River at the head of Hamilton Inlet—the ultimate goal of the expedition. On July 12 the ascent of the river was begun.

The party included besides Mr. Bryant, Mr. Russell W. Porter, topographer, two Newfoundland canoemen and the two natives above referred to. Advancing in three canoes, good progress was made and on the fourth day the lower falls were reached, fifty-five miles from the mouth of the river. Here the Indian guides deserted the party and soon after one of the canoemen injured his knee. These mishaps reduced the working force to three men. Under these adverse conditions, ten days were occupied in transporting canoes and supplies around an eleven mile portage which occurred at the upper falls of the river.

Eventually the river was ascended to its source in a lake on the Height of Land one hundred and forty-one miles from the point where the stream enters the Gulf of Saint Lawrence.

Some time was spent in locating the Indian route of travel across the watershed; but this was eventually found, and it was estimated that in ten days more the party would have reached Hamilton Inlet. The condition of the injured canoeman had in the meantime become serious, as the exigencies of wilderness travel did not permit of proper rest for the disabled man. Under the circumstances, and rather than risk permanent injury to his companion, the leader

determined to return to the mouth of the river, where he arrived on August 23.

Although prevented by humane considerations from completing his programme, Mr. Bryant considers the summer with its attendant hardships was well spent, inasmuch as his party was the first to ascend and correctly map this important river.

In addition to the strictly geographical work accomplished, geological and entomological collections were made and photographs secured illustrating parts of the interior heretofore unvisited by white men.

The above summary is submitted pending the preparation of maps and a more detailed report of the results of the expedition.

GEOGRAPHIC NEWS AND NOTES

In the September issue of the *Geographical Journal* Ellsworth Huntington has the first installment of an important discussion of "The Fluctuating Climate of North America." Mr. Huntington's conclusions are based on the field work of three months in 1910, four in 1911, and four in 1912, in connection with the Desert Laboratory at Tucson, Arizona, and are cited in support of his theory that in historic times the synchronous climatic pulsations that have occurred in the temperate zone across Asia and Europe have also taken place in North America. The Carnegie Institution is to publish in book form Dr. Huntington's findings under the title "The Climatic Factor in the Evolution of Arid America."

The author devotes this first article to the Gila valley in southern Arizona. He says, in part, that "after due allowance has been made for other causes, the majority of the numerous fluvial terraces which are found in such large numbers among the mountains of the American south-west seem to be the product of variations of climate. Their distribution, number, and nature are almost identical with those of similar regions in Asia, which in itself points to a common origin. The oldest may possibly go back to the last epoch of the glacial period, but there are three or four of much later date, and the youngest can scarcely be more than one or two thousand years old."

Explaining his choice of a region for investigation, the author says "that valley was not chosen because of the strength of its evidences of climatic changes, but merely because it happened to be the first which I investigated and the one where I spent most time. Half a dozen others might have been chosen equally well. The same type of phenomena are displayed with equal clearness in the Altar valley of northwestern Mexico, in the Chaco valley 500 miles to the northeast in the northwestern corner of the state of New Mexico, and in unnumbered valleys between the two, and in the regions round about. Wherever I investigated the matter I found the same type of evidence."

R. Malcolm Keir, of the Department of Industry and Geography of the University of Pennsylvania, contributes to the August issue of the *Bulletin of the American Geographical Society* a study of "Fisheries—An Example of the Attitude toward Resources." This article might profitably be read in connection with a volume recently issued by the University of Pennsylvania, in its "Series in Political Economy and Public Law," namely, Professor Raymond McFarland's "History of the New England Fisheries."

Mr. Keir discusses the successive eras of waste, conservation, and government restoration in the lobster, shad and oyster fisheries, presenting in a succinct statement facts not generally realized. "The fish industry employs 150,000 men and the annual value of its products is over \$50,000,000. It is taken as an illustration of the attitude toward all resources, because it so well shows all the phases through which resources pass. In regard to some of our resources we are still in the first stage. Others we are wasting thoughtlessly. Toward many we are getting uneasy and preaching conservation, but in none except fisheries have we actually taken the last step and regenerated a resource that had been lost. For this reason, fisheries are here used to illustrate the whole field."

THE TRANSCONTINENTAL GEOGRAPHICAL EXCURSION.—Unique in the history of geographic science is the Transcontinental Excursion of 1912, conducted by the American Geographical Society of New York, which has just ended. After a few preliminary short excursions to the anthracite coal fields and to New Jersey points, the party of about seventy left New York by special train on August 22. Of these, forty-four were foreign members, representing nearly every country of Europe, delegates from practically all the leading universities and geographical societies. These members made the entire circuit from the Atlantic to the Pacific and return. The American membership, with the exception of about ten, who made the entire journey, were constantly changing, some joining the train for a day or two, others going longer distances. In nearly all cases, however, it was arranged that some American authority would be with the party through that section in which his chief work had been done, and who conducted the party in that region and lectured on its geographic features.

Leaving New York City, the party crossed New York State over the New York Central Railroad, stopping at Fishkill, Little Falls, Syracuse and Ithaca for brief periods. After two days at Buffalo and Niagara Falls, the route led, with occasional stops, to Chicago, Madison, Minneapolis, Duluth and the Yellowstone Park. After six days in the Park, the trip was resumed, with stops at Butte, Spokane, Coulee City, the Yakima Valley, Seattle, Portland, Crater Lake and Klamath Falls to San Francisco.

Returning, the way led through Nevada to Salt Lake City and Denver. Here, the route branched off to the Grand Canyon of the Colorado, the Petrified Forest and the Roosevelt Dam. Returning, the trip eastward was resumed through eastern Colorado and Kansas to St. Louis and Memphis. After a day on the Mississippi, the railway route was continued to Birmingham and Chattanooga, thence northward to Washington, where four days were spent, before the final disbandment at New York on October 18.

The excursion was organized and conducted by Professor William Morris Davis, of Harvard University, and held under the auspices of the American Geographical Society of New York, in celebration of the sixtieth

anniversary of its founding and the occupation of the new building it has just entered.

CLASSIFYING NATIONAL RESOURCES.—The classification of the mineral wealth of the public domain is being carried steadily on by the United States Geological Survey. Coal, oil, phosphate, water power sites, etc., are being valued and reserved. The total area of coal land that has been classified and valued in individual 40-acre tracts by the land board of the survey since its organization has been 16,174,200 acres, valued at \$721,856,656. The price at which this land would be subject to sale to-day under the coal land law, without classification, would be \$275,673,800, a difference in favor of the government of over \$446,000,000.

PRODUCTION OF COAL IN CHINA.—According to a statement in *Daily Consular and Trade Reports*, the total production of coal in China at present reaches nearly 10,000,000 tons annually. This is the estimate of the geological bureau of the South Manchurian Railroad. Of this, Manchuria furnishes 1,300,000 tons, Chili 2,164,312 tons, Shansi 2,500,000 tons, Shantung 933,000 tons, Honan 900,000 tons, Kiang-si 800,000 tons, Hunan 500,000 tons, Szechuan 300,000. Only a portion of this coal comes into the markets of China. The average cost of unscreened coal at the pit mouth in the Fushan mines in Manchuria is about 85 cents gold per ton, indicating that, with improvement of transportation facilities, Chinese coal will compete with any or all coal in the Far East or elsewhere. The Manchurian Railway Co. is about to construct vessels for carrying coal to Peru.

Nelson has been chosen as the terminal point on the Hudson Bay for the railway now being built from Le Pas. A railway has also been authorized running from Montreal northwesterly to Ottawa Harbor on James Bay. The promoters expect that there will be a large grain shipment over this line from Nelson to Montreal.

The Cabinet at Peking has been instructed by the President of China to discuss and adopt a national costume. Special importance shall be attached to the native customs and materials in making the styles and patterns.

The land opened for rubber in the Federated Malay States in 1911 was 107,200 acres, more than double that of 1910. The rubber output was 1,809,617 lbs., an increase of about 75 per cent.

BOOK NOTES AND REVIEWS

Dryer, Charles Redway. *High School Geography.* Pp. 518. New York: American Book Company, 1912.

The recent movement among high school leaders to supplant the study of physical geography by the broader science of geography, in which greater emphasis is laid upon the relationship of man's activities to his physical environment, has started a new stream of high school geographies, for which this book by Professor Dryer was the first to appear. That such a book is needed cannot be questioned. And if we were to judge the volume here under consideration by the high ideals held up in its preface, we should regard this as well meeting the need. Unfortunately the parts of the book which are new—the sections on economic and regional geography—do not satisfy the anticipations furnished by the preface.

Part I, Physical Geography, which takes up half of the book, is little more than an abridgment of the same author's "Introduction to Physical Geography," treating of the usual subjects of Earth, Sun and Moon; the Land; the Sea; the Atmosphere; etc., with added paragraphs or chapters on economic relations. But very often the relationships are very lightly touched upon or ignored. For example, Chapter V deals with "Gradation by Running Water," discussing the usual topics of such a chapter, including alluvial fans, deltas and flood-plains. In Chapter VI, "The Economic Relations of Streams," among other topics, Irrigation is treated, but in the discussion no reference is made to the relation of irrigation to alluvial fans, flood-plains, etc. The author does mention in a sentence the value of cones to irrigation under the discussion of deposition (p. 81), but under Irrigation the subject is treated with no reference to geography—physical or otherwise. This is but one of many similar examples that might be selected showing that relationships are not made vital.

Part II of the book, consisting of 64 pages, is called Economic Geography. The author defines this "science" as "the study of those natural resources which are useful to man, and of the uses which men make of them" and says that "the chief natural factors of economic geography are (1) the substratum, or ground, (2) climate, (3) plants, and (4) animals." He then proceeds to describe the various raw materials of commerce under the headings of Food Supply; Clothing and Constructive Materials; Heat, Light, and Power; Manufacture, Trade, and Transportation. And yet in the preface of this book the author quotes with apparent high approval the definition of economic geography given by a recent writer as "the study of different types of environments in the relations they bear to the activities of human life."

In Part II there is no such treatment. It is not geography of any kind. It is simply description of certain raw materials of trade.

Part III, Regional Geography, takes up the various continents and countries, treating them by methods not widely unlike those found in many Commercial Geographies. Here again, relationships are almost ignored. Take, for example, the section on the British Isles (pp. 429-438). The physical description as well as the economic is mostly empirical. Only at the end (p. 438), and in fine print, indicating that it is regarded as subsidiary, is the "geographic basis of British power and prosperity" mentioned—namely: "(1) The position and coast line of the British Isles, which furnish unequalled advantages of foreign trade; (2) the 'silver streak' of water which has protected the country from foreign invasion for 800 years; (3) the complex structure of the land, accompanied by low or moderate relief; (4) the mild, moist, and equable climate; (5) the large supply of coal and iron." In a work on geography these factors certainly should be emphasized and expanded, not regulated to an inconspicuous place at the end of the section.

As a text, this book is apt to be confusing to the pupil. Classifications are too many and complex, and often inconsistent. Take, for example, the classifications of world provinces. On page 328, as introduction to Part III, the map gives the "natural provinces" of the world based upon climate. Then on p. 339, other types, based upon special conditions of relief, accessibility, etc., are added to this classification. The following chapter on North America, however, ignores this first classification and gives one for "physiographic provinces," each province being briefly described in Chapter 24. Chapter 25 goes back to the natural province classification, describing them briefly, but followed by a discussion of Agriculture, Minerals, etc., without showing clearly the relationships of these resources to the geographic province. The treatment is not only confusing, but it is non-geographic, if we use the author's conception of geography as a science that shows relationships.

The book is profusely and finely illustrated with diagrams, photographs and many excellent colored maps. It brings together a great amount of useful and interesting information. Its physical make-up cannot but attract the reader's attention.

Shuster, W. Morgan. *The Strangling of Persia.* Pp. lxiii, 415. Illustrated with photographs and map. New York: The Century Co., 1912. \$2.50 net.

This book by the ex-Treasurer-General of Persia is a noteworthy commentary upon the nature of European diplomacy in Asia. Selected by the Medjlis, the parliamentary body of the Persian Government, to reform and put upon a firm basis the confused finances of that land, Mr. Shuster, an American, undertook a most difficult task. Yet so effective was his work being accomplished that within a few weeks after his arrival in Teheran in May, 1911, the strong and cunning hand of Russia was raised against him and in December, eight months after his arrival, the Russian government, unopposed by Great Britain, to whom the Persians appealed for advice and

moral support, succeeded in destroying the Constitutional government in Persia and in driving Mr. Shuster from his post. With his departure was rung the death-knell of Persian independence. In spite of the fact that the two great nations, Russia and Great Britain, by the agreement of 1907, guaranteed the integrity and sovereignty of Persia, the year 1911 saw the destruction of that independence by the one nation while the other utterly ignored its obligations to a weak nation, if it did not actually encourage its humiliation.

Mr. Shuster's story is told in a style so direct and straight-forward, and yet so fortified by facts (the appendix contains copies of much of the correspondence and many state papers), that it carries conviction to the reader. "In the belief," says the author in his preface, "that the real interests of humanity and the betterment of international relations demand that the truth be told in cases of this kind, I have written down the facts with a bluntness which perhaps, under other circumstances, would be subject to criticism." And it is a story that thrills with interest merely as a personal narrative and aside from its value as a piece of modern history. It was openly boasted among the diplomatic corps in Teheran that the new Treasurer-General would remain but a few weeks. Against the intrigue of foreign nations and the reactionary forces in Persia, his own life threatened, subtly offered bribes by representatives of a foreign power, Mr. Shuster went frankly ahead, maintaining rigid loyalty to Persian Constitutional Government, and for eight months withstood, practically alone among foreign residents in Teheran, the heavy odds against which he was working.

Aside from the sixty pages of introduction, which give briefly the story of the establishment of Constitutional Government in Persia, a necessary background for the events later recorded, this book is confined to Mr. Shuster's work as Treasurer-General and the events with which that work made him a part—events in which, the author says, "two powerful and presumably enlightened Christian countries played fast and loose with truth, honor, decency and law, one, at least, hesitating not even at the most barbarous cruelties to accomplish its political designs and to put Persia beyond hope of self-regeneration." Such a story is of more than present interest, it is of permanent value as a piece of diplomatic history. It well illustrates one method by which the political map of Asia is being changed.

Colquhoun, Archibald R. *China in Transformation*. Pp. 298. New York: Harper & Brothers, 1912.

This is announced as a revised edition of the author's book of the same title that was issued in 1898. The revision, however, has practically produced a new book. Some of the chapters remain essentially the same, while entirely new chapters have been introduced and all has been brought up to date. A large colored map of China, Korea and Japan accompanies the text and also a smaller railroad map of China. Written by one whose acquaintance with the Far East has been long and intimate, this book carries with it an authority

and up-to-dateness that makes it of exceptional value to the student and to the general reader who desires information concerning present-day conditions in the newest and most populous Republic.

It is difficult in the short space of a review to do more than indicate some of the interesting features of the book. Of the variety of subjects treated in the thirteen chapters, perhaps those are most interesting, to-day, that deal with Chinese Democracy, the New Learning, the Native Press, the Economic Problem. Revolution is no new thing in China, as many have supposed. "China has, indeed, been called the classic ground of revolutions, as many as twelve having occurred between A. D. 420 and 1644. Rebellions have been innumerable. The Empire is never free from them; they are of all dimensions and of varied durations." This tendency to revolt against oppression or misrule is an indication of the in-born spirit of independence that is found among the Chinese. "It is the peasant who rules, by a human right which no 'Son of Heaven' dares to question," says the author of this book. Indeed one of the canons laid down in China's oldest classic is "that the people have the right to depose a sovereign who, either from active wickedness or vicious indolence, gives cause to oppressive or tyrannical rule." And thus it is that the authority exercised from the throne, which has been imposed upon the Chinese, has never succeeded in taking away their control of their own local affairs. How such a real democracy has been maintained in China is an anomaly not easily explained. Whether it can be made the basis of a Republic, the author does not venture to prophesy. For, as is shown in the Chapter on the Chinese People, the Chinese are content with their local freedom and have no concern with political affairs. "The popular maxim is that, as the mandarins are paid for attending to public administration, it is their business to do it, while the public cultivates its garden and pays its taxes." "Patriotism" in our western sense does not exist. Says the author, "what represents patriotism in China is a survival of clannishness, which affects small segregated areas—not a provincial or even a civic patriotism, but rather a local village spirit which on occasion is capable of combining to resist extortion or resent interference." Such characteristics certainly forebode ill for a republic, where interest in political affairs by all the people is a necessity for honest and effective government. Time alone can tell whether or not the innate democracy of the people will extend itself from local to national affairs and show itself in a national consciousness that will insure a successful and permanent republican form of government.

If not in other ways, it seems certain that the Chinese will excel in commercial affairs at any rate. "They are" says the author, "the original, true and only real shopkeepers, and in every position of life, even the farthest removed from the atmosphere of commerce, the Chinese may be said to think in money." Already the Westerner is finding himself unable to compete with the Chinese wherever they have established themselves in trade.

In the Chapter on the Economic Problem the author bases his estimates of China's coal resources upon Richthofen's researches, and gives the usual large estimates for the anthracite fields of Shan-si. Bailey Willis's more recent investigations seriously question those estimates of Richthofen, but the author is evidently not acquainted with his work. While the coal resources of China are very large, they undoubtedly are not so enormous as were at first thought. It is to be hoped that one of the first scientific investigations to be carried on in China will be by the geologist in order that the present hazy knowledge of her mineral wealth may be cleared. Until then, accounts of mineral resources must be necessarily unsatisfactory.

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